# Survey of Jet Fuels Procured by the Defense Energy Support Center

## 1990 - 1996

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IN REPLY
REFER TO

June 9, 1998

# SURVEY OF JET FUELS (1990-1996)

This first report is a compilation of data which are representative of the quality of jet fuels (JP4, JP5, and JP8) purchased by the Defense Energy Support Center (DESC) worldwide. This information was obtained from our Petroleum Quality Information System (PQIS), an automated system which contains product quality history. This database contains over 6000 records of aviation fuel deliveries, which represents 8.5 billion gallons of product.

The data contained in this report are summarized to provide statistical information on average, minimum and maximum values of selected test properties for use by our customers in researching specification or quality issues.

Although this report covers seven years of quality history, future reports will be published on an annual basis.

Comments and questions of this report and recommendations for future reports are welcome. Please contact Mr Kenneth Henz at Commercial (703) 767-8356 or DSN 427-8356.

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## Section I - Executive Summary

The Defense Energy Support Center (DESC) purchases fuel in bulk quantity for the military services. Complete specification analyses for each shipment of product on a DESC contract were sent to the DESC quality office for data collection purposes. However, the military services and industry use various reporting formats to transmit the test results. The Office of the Assistant Secretary of Defense, Energy Policy Directorate, in 1989, authorized the establishment of Petroleum Quality Information System (PQIS), which would standardize data entry, be used to track trends in product quality and to resolve quality questions. The initial implementation of PQIS began with aviation fuels (JP4, JP5 and JP8) procured for the military. The first data entry occurred in 1990. Since then, up to and including 1996, the database contains 6093 records of deliveries of aviation fuel to the US Government representing 8.5 billion gallons of product.

**Section I** of this report presents summary data for the number of reports received and the volume purchased by calendar year and region (as defined in *Chart 3*). The assignment of states to region parallels the Petroleum Administration for Defense Districts (PADDs) used by the petroleum industry for statistical purchases. The data shows that almost all the product over the six years was purchased within specification limits. Histograms, which display complete data over all years for each product and fuel property, are summarized in **Section II**. **Section III** provides, for each individual test parameter for an individual fuel, a further breakdown of statistical information in the **Appendix** section as a series of Tables, displaying minimum, maximum, average and volumetrically weighted average data by region and year. Other queries or views of data can be obtained by contacting the Point-of-Contact (POC) listed below.

Military specifications are used to procure the aviation fuels for the US Government. Therefore, the trends noted in this report might not necessarily reflect those seen in industry, since the military fuel is in some cases specially blended to meet the military specifications. Included in this report are test result information obtained from the North Atlantic Treaty Organization (NATO) report for Jet A1 entering the Central European Pipeline System (CEPS) for calendar year 1996. These NATO values can be compared to the JP8 tables in the Appendix for calendar year 1996 and Region 7, which includes Europe. A short summary of data for each property of the aviation fuels is included in **Section III**.

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## Section II - Introduction and General Information

### Background

In 1987, the Logistics Management Institute (LMI) published a report entitled: *"Petroleum Quality Information System (PQIS): Architecture and Design Alternatives"* which outlined system requirements and alternatives for a system that would store and process information on the quality of petroleum products procured and used by the Department of Defense (DoD). In February 1988, the Office of the Assistant Secretary of Defense, Energy Policy Directorate, made a request for review and comment on this LMI report to the Services. Responses were collected from March - May 1988, which clearly established the need for a system to track quality trends and to have a standardized method of entering in data electronically. As a result of the survey, the Defense Energy Program Policy Memorandum (DEPPM) 89-1, dated 25 April 1989 was issued which established the requirement for PQIS and designated the Defense Fuel Supply Center (Hereafter referred to as the **Defense Energy Support Center** [DESC]) as responsible for designing the PQIS. PQIS was planned as an automated mainframe information management system that would standardize dissimilar government and private sector quality control and surveillance data reporting formats into a standardized format. The information in the database would be available to DoD personnel for use in identifying, investigating, and resolving fuel related equipment problems.

The DEPPM 89-1 authorized LMI to develop a prototype to be tested and evaluated by DESC. The review was completed in March 1989. Because of funding constraints and the complexity of designing an all-encompassing system, the initial PQIS database system was built around procurement of aviation fuels (JP4, JP5 and JP8). This prototype PQIS system was put into operation in October 1990. The initial system was PC-Based (in DBase IV), not on a mainframe. The first report entered into the database was dated 25 Sep 90. Since that time, the database program was converted to Access 2.0, then Access 7.0. Test reports received from contractors worldwide were entered into the database. There are plans in the near future to expand the system to include other fuels and quality surveillance data.

### Summary Information

The data which follows represents **299 individual contracts** over six years, having **6093 data points** total representing a total of **8.54 billion gallons** of JP4, JP5 and JP8. *Chart 1* below shows number of shipping tank reports entered per year starting from the last three months of calendar year 1990 through the end of calendar year 1996.

*Chart 1*

**Total Jet Fuel Entries by Calendar Year**

| Fuel | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | Total |
|---|---|---|---|---|---|---|---|---|
| JP4 | 99 | 843 | 660 | 773 | 274 | 138 | 2 | 2789 |
| JP5 | 32 | 254 | 192 | 135 | 56 | 31 | 131 | 831 |
| JP8 | 7 | 17 | 25 | 157 | 423 | 745 | 1099 | 2473 |

The above data in *Chart 1* indicates number of test reports for individual shipping tanks that were received, not the number of shipments made. A single product movement may involve more than one shipping tank, just as many product movements (e.g., truck shipments) could have the same source tank. The quantity shipped from each tank is meant to indicate actual quantity shipped to the US Government under DESC contract at a refinery or terminal from a particular shipping tank, not the total quantity in the Tank at the time of sampling. Thus, this database represents what was actually delivered to DESC

*Chart 2*

**Total Volume by Calendar Year of Jet Fuels Delivered**
**(Volume in Millions of Gallons)**

| Fuel | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | Total |
|---|---|---|---|---|---|---|---|---|
| JP4 | 109.18 | 1355.14 | 858.81 | 681.05 | 203.11 | 66.88 | 0.66 | 3274.83 |
| JP5 | 47.80 | 463.35 | 376.52 | 327.51 | 148.92 | 33.57 | 350.29 | 1747.96 |
| JP8 | 3.99 | 12.43 | 12.70 | 213.51 | 531.40 | 995.60 | 1749.02 | 3518.65 |

customers. The quantity reported on the test report from each shipping tank forms the basis for

*Chart 3*

calculating the volumetrically weighted average (See "Use of Terms", page 8, for a definition of

Chart By Fiscal Year of Volume of Jet Fuels Reported and Percentage of Total Volume Purchased*
(Millions of gallons)

| JP4 | 1992 | 1993 | 1994 | 1995 | 1996 |
|---|---|---|---|---|---|
| Reported** | 1386 | 575 | 270 | 106 | 0.8 |
| Purchased | 2863 | 2217 | 704 | 231 | 2.6 |
| Percentage | ***48%*** | ***26%*** | ***38%*** | ***46%*** | ***31%*** |

| JP5 | 1992 | 1993 | 1994 | 1995 | 1996 |
|---|---|---|---|---|---|
| Reported** | 519 | 202 | 230 | 67 | 246 |
| Purchased | 1180 | 1150 | 1018 | 992 | 1039 |
| Percentage | ***44%*** | ***18%*** | ***23%*** | ***7%*** | ***24%*** |

| JP8 | 1992 | 1993 | 1994 | 1995 | 1996 |
|---|---|---|---|---|---|
| Reported** | 25 | 65 | 451 | 995 | 1621 |
| Purchased | 374 | 402 | 1808 | 2409 | 2820 |
| Percentage | ***7%*** | ***16%*** | ***25%*** | ***41%*** | ***57%*** |

*Source: DFAMS Data Files
** PQIS Database includes only contract procurement purchases.

volumetrically weighted average) for a specification property. *Chart 2* below represents total volume delivered each year for JP4, JP5 and JP8.

*Chart 3* below shows by fiscal year (vice calendar year) the volume (in millions of gallons) of fuel purchased according to the DFAMS historical records compared with the total volume in the PQIS database for that same fiscal year. The percentage represents volume of product indicated by the DD 250-series documents in the PQIS database versus the volume of product purchased according to DFAMS. The fiscal year begins in October and ends September of the following year. Percentages in *Chart 3* show an increasing compliance trend for JP8, according to comparisons with the DFAMS database, up to almost 60% compliance. Volumes in *Chart 3* represent information on complete specification results on the aviation fuels JP4, JP5, and JP8 on a *world-wide* basis focusing on what was shipped to DESC customers.

The ability to group this world-wide data into geographical areas (e.g., Europe, Western US, etc) may be desirable in order to provide a more specific or focused analysis of data for a particular area of interest. For example, a researcher may want to know how the sulfur results vary for the West Coast of the United States versus the East Coast. To assist in this regional type of analysis of characteristics of fuels purchased by the US Government, "regions" were assigned to each state in the United States and geographically in overseas areas. These "regions" are defined in *Chart 4*, which divides the continental United States along the same lines as the PADDs (Petroleum Administration for Defense Districts).

*Chart 4*

**Regional Assignments for PQIS Report**

| Region | PAD District | Title | States or Countries |
|---|---|---|---|
| 1 | I | East Coast | ME, VT, NH, MA, RI, CT, NY, PA, NJ, DE, MD, VA, WV, NC,SD, GA, FL |
| 2 | II | East Central | ND, SD, MN, IA, NE, WI, MI, OH, KY, TN, IN,IL, MO, KS, OK |
| 3 | III | Gulf Coast | AL, MS, AR, LA, TX, NM |
| 4 | IV | West Central | MT, ID, WY, UT, CO |
| 5 | V | West Coast | WA, OR, CA, NV, AZ |
| 6 | | Middle East | Kuwait, Bahrain |
| 7 | | European | Europe, Israel and Turkey |
| 8 | | Pacific | Korea, HI, AK, Australia |

Since the end of World War II, the Petroleum Administration Districts were used by the Department of Energy to divide the United States into regions for use in statistical analyses (mainly price factors) as a common baseline for calculating and reporting. The use of the PADDs in this report provides the advantage of using an existing common industry reference for comparative statistical purposes.

## Use of Terms

To avoid confusion or misunderstanding in discussions, terms used within this report are used as follows:

a) **Spectender** - A complete specification analysis report of product being offered for acceptance by the US Government. For fuels, it is the written report of results for full specification testing in the refinery or terminal shipping tank for product offered for acceptance.
b) **Report** - Represents one spectender tank test result (Complete Specification Test Results), regardless of how many shipments were made out of the tank or if more than one tank was involved in a total loading or product movement.
c) **Volume** - Total volume, expressed in millions of gallons, delivered to the US Government or other designee from the shipping tank referenced in the report.
d) **Region** - As defined in *Chart 4*, refers to the grouping of states and countries based in the continental United States on the PADDs. These regions do not correlate with the Defense Fuel Regions or Offices. Since shipments can originate and terminate in different regions, the determination of the region was chosen based on the refinery location rather than the receipt location.
e) **Average/Volumetrically Weighted Average** - The average calculation based on volume of fuel purchased rather than each instance of purchase. For example, if one batch of product had an API Gravity of 46.0 with 1,000,000 gallons delivered and another batch had an API Gravity of 43.5 with 500,000 delivered, the **average**, based on occurrences of test values, would be:

$$(46.0 + 43.5)/2 = 44.75.$$

The **volumetrically weighted average**, based on volumes of product represented by the test values, would be:

$$(46.1 \times 1{,}000{,}000) + (43.5 \times 500{,}000) / 1{,}500{,}000 = (67{,}750{,}000 / 1{,}500{,}000) = 45.17$$

The difference between the two averaging methods is 0.42°API. Each method uses a different basis to calculate the average. Both averages are provided in this report.

f) **NATO/CEPS JA1** - On 3 December 1997, a NATO Unclassified report, authored by Dr. M. A. Silverman, was received at DESC which summarized data for 15 suppliers for Jet A-1 (JA1) received into the Central European Pipeline System (CEPS) for calendar year 1996. The report was published 28 Nov 97 with *Reference Number **004387***, *File No **OPS/QC/97:058***. Encompassed by this North Atlantic Treaty Organization (NATO) Report are 1,528 complete specification test results representing 1.69 billion gallons of JA1 delivered into CEPS entry points. The test result information was extracted from refinery Certificates of Quality provided for each batch of JA1. The product was delivered to commercial airports and to military air bases in the CEPS area of activity. The results presented in this report are comparable with "Region 7" for 1996 in this annual report. Where appropriate, the results from the NATO Report will be included as a footnote in order to evaluate these trends against worldwide trends. Statements in this report, preceded by "NATO/CEPS JA1", indicates that what follows is information taken directly from the Publication.

**Summary of Data by Region**

The next three charts provide a breakdown of the total number of reports received per region and a further breakdown of volume and number of reports received for each product grade. In calendar year 1990, data was collected beginning in September, thus 1990 does not represent the entire calendar year's worth of data. However, 1990 is included as a reference in evaluating trends in test results. In future reports, the years 1990 through 1994 will be dropped for statistical purposes.

*Chart 5* below indicates total aviation fuel test reports received by year from each region as an aid in evaluating data presented in this report. Clause E40.05, *Material Inspection and Receiving Report*, requires our contractors to send in a copy of the complete laboratory test reports from each shipping tank used for shipments. The differences among the total number of reports is not necessarily a direct indicator of contractor compliance with DESC contract clause E40.05 which requires copies of the DD-250-series documents to be mailed to DESC. The discrepancies are a function of contract award patterns, amount of fuel needed for a particular period, military deployments, Replacement-in-Kind (RIK) shipments and fuel conversions during the reporting period.

*Chart 5*

## Total Reports Received by Year and Region

| | Region | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Year** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **Total** |
| 1990 | | 3 | 33 | 33 | 61 | | | 8 | 138 |
| 1991 | 36 | 175 | 554 | 93 | 210 | | | 46 | 1114 |
| 1992 | 17 | 115 | 459 | 78 | 186 | | | 22 | 877 |
| 1993 | | 84 | 596 | 194 | 154 | | 20 | 17 | 1065 |
| 1994 | | 72 | 348 | 204 | 88 | | 10 | 31 | 753 |
| 1995 | 30 | 83 | 349 | 150 | 154 | | 30 | 118 | 914 |
| 1996 | 61 | 120 | 464 | 81 | 226 | 8 | 129 | 144 | 1232 |

The values above represent the number of possible data points available for each region for JP4, JP5 and JP8 received and entered into the PQIS database for each report year. Again, the number of occurrences do not directly relate to the number of shipments made during that year since one batch from the refinery tank may have been used for multiple shipments on different orders. Information in *Chart 5* is provided as an indication of the responses received from the different regions. The greatest number of reports comes from Regions 2 through 5. Region 3, which includes Texas, leads in the submissions of reports.

*Chart 6* below represents the volume of aviation fuels, in millions of gallons, refined each calendar year from the various regions and sold to Department of Defense customers.

## *Chart 6*

## Yearly Regional Breakdown by Fuel of Volume Received

**(Millions of Gallons)**

| | | Region | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **Fuel** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **Total** |
| **1990** | JP4 | | 2.21 | 14.42 | 28.07 | 53.31 | | | 11.17 | 109.18 |
| | JP5 | | | 14.98 | | 32.82 | | | | 47.80 |
| | JP8 | | | | | 3.99 | | | | 3.99 |
| **1991** | JP4 | 46.39 | 199.99 | 803.84 | 55.02 | 190.39 | | | 59.51 | 1355.14 |
| | JP5 | | 5.88 | 298.50 | | 158.98 | | | | 463.35 |
| | JP8 | | | | | 8.53 | | | 3.91 | 12.43 |
| **1992** | JP4 | 21.25 | 134.90 | 503.23 | 29.35 | 165.73 | | | 5.35 | 858.81 |
| | JP5 | | 5.96 | 232.95 | | 137.62 | | | | 376.52 |
| | JP8 | | | | | 4.41 | | | 8.29 | 12.70 |
| **1993** | JP4 | | 149.70 | 351.90 | 90.20 | 80.29 | | | 9.37 | 681.05 |
| | JP5 | | | 266.90 | | 5.02 | | 55.59 | | 327.51 |
| | JP8 | | | 53.93 | | 118.41 | | 20.58 | 20.60 | 213.51 |
| **1994** | JP4 | | 72.02 | 27.17 | 103.91 | | | | | 203.11 |
| | JP5 | | | 125.45 | | | | 23.48 | | 148.92 |
| | JP8 | | 28.48 | 302.96 | | 151.15 | | 5.75 | 43.06 | 531.40 |
| **1995** | JP4 | | | | 61.87 | | | 4.89 | 0.12 | 66.88 |
| | JP5 | | | 10.50 | | | | 23.07 | | 33.57 |
| | JP8 | 2.88 | 126.64 | 455.41 | 9.88 | 239.30 | | 65.12 | 96.38 | 995.60 |
| **1996** | JP4 | | | | | | | | 0.66 | 0.66 |
| | JP5 | | | 240.39 | | 29.52 | | 70.64 | 9.74 | 350.29 |
| | JP8 | 18.76 | 182.59 | 608.81 | 76.36 | 412.67 | 39.86 | 259.46 | 150.51 | 1749.02 |

As more locations converted from JP4 to JP8, the total volume of JP4 delivered decreased as the total volume of JP8 delivered increased. It is possible to further break down the volumes received by the state in which the refinery is located, by company name, by refinery location or by contract.

*Chart 7* provides information on the number of reports received per calendar year per region. This chart represents a more detailed breakdown of *Chart 5*. It shows, for each region and product grade, how many reports were received for each calendar year.

## *Chart 7*

## Yearly Regional Breakdown by Fuel of Reports Received

| | | Region | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **Fuel** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **Total** |
| **1990** | JP4 | | 3 | 27 | 33 | 28 | | | 8 | 99 |
| | JP5 | | | 6 | | 26 | | | | 32 |
| | JP8 | | | | | 7 | | | | 7 |
| **1991** | JP4 | 36 | 166 | 409 | 93 | 96 | | | 43 | 843 |
| | JP5 | | 9 | 145 | | 100 | | | | 254 |
| | JP8 | | | | | 14 | | | 3 | 17 |
| **1992** | JP4 | 17 | 107 | 354 | 78 | 100 | | | 4 | 660 |
| | JP5 | | 8 | 105 | | 79 | | | | 192 |
| | JP8 | | | | | 7 | | | 18 | 25 |
| **1993** | JP4 | | 84 | 404 | 194 | 85 | | | 6 | 773 |
| | JP5 | | | 121 | 1 | 3 | | 9 | | 135 |
| | JP8 | | | 69 | | 66 | | 11 | 11 | 157 |
| **1994** | JP4 | | 52 | 18 | 204 | | | | | 274 |
| | JP5 | | | 49 | | | | 7 | | 56 |
| | JP8 | | 20 | 281 | | 88 | | 3 | 31 | 423 |
| **1995** | JP4 | | | | 134 | | | 1 | 3 | 138 |
| | JP5 | | | 24 | | | | 8 | | 31 |
| | JP8 | 30 | 83 | 326 | 16 | 154 | | 21 | 115 | 745 |
| **1996** | JP4 | | | | | | | | 2 | 2 |
| | JP5 | | | 98 | | 9 | | 22 | 2 | 131 |
| | JP8 | 61 | 120 | 366 | 81 | 217 | 8 | 106 | 140 | 1099 |

*Chart 7* can be used in conjunction with *Chart 6* to get an idea of the average parcel size, which can be indicative of which modes of transportation are used. For example, for Region 6 for JP8 in 1996, 8 tenders were reported representing 39.86 million gallons, which means that each tender represented just under 5.0 million gallons, or the parcel size of a tanker. Reported for Region 4 in 1992 were 78 tenders representing 29.35 million gallons of JP4, or an average parcel size of 0.376 million gallons or 376,000 USG. This could represent mainly truck shipments mixed in with some pipeline shipments of JP4 during this time frame for Region 4.

## Product Specifications

During the time frame covered by this report, there were 4 revisions to specification MIL-T-5624 and 2 revisions to MIL-T-83133 used to procure product. Fortunately, there were not many changes to specification parameters caused by these revisions. Any specification change are noted in the series of charts, for year and region, specific for each test property and fuel, which appear in the Appendix section of this report. As the US military purchased only Military specification products by contract, the trends reflected in this report might not necessarily mirror those seen in the commercial petroleum industry. For example, the military specifications generally have a storage stability requirement which the commercial industry does not have, thus the refining techniques may differ in some respects to produce product meeting the storage stability requirement. The two fuels may have slightly different physical and chemical properties, thus giving differing results. These fuels would be similar, not the same.

For the purposes of this report, only those specification properties, which have measurable and definitive requirements in the specification, are summarized, with the exception of cetane index (report only) and naphthalene content (not required for JP4 and JP5). Those specification properties, which involve an assigned rating (e.g., water reaction, JFTOT, and copper corrosion), are not summarized in this report to conserve space. However, data is available for the specification properties not reported by request from the Point-of-Contact (POC) provided in **Section III**. Histograms in **Section II** represent the volumes of property values over all years and regions. The Tables in the **Appendix** show minimum, maximum, average, and weighted average property values according to year and region for each property of each fuel.

Not all tests were performed on all batches. For *Net Heat of Combustion*, contractors have a choice of two or three different units of measurement, depending on the product, for reporting the net heat or energy content. Contractors also have the option of performing the *Doctor Test* in lieu of *Mercaptan Sulfur*: If the *Doctor Test* is negative, the *Mercaptan Sulfur* need not be performed. Some contractors elected to report both the *Doctor Test* and *Mercaptan Sulfur*. If the *Smoke Point* was below 25 mm, the product was still acceptable as long as the *Naphthalene Content* was below 3.0% and the *Smoke Point* was above the minimum of 19 mm. Specification limits are provided on all charts. For all Tables, the specification values and any changes to them are indicated.

## Section III - Histogram Charts

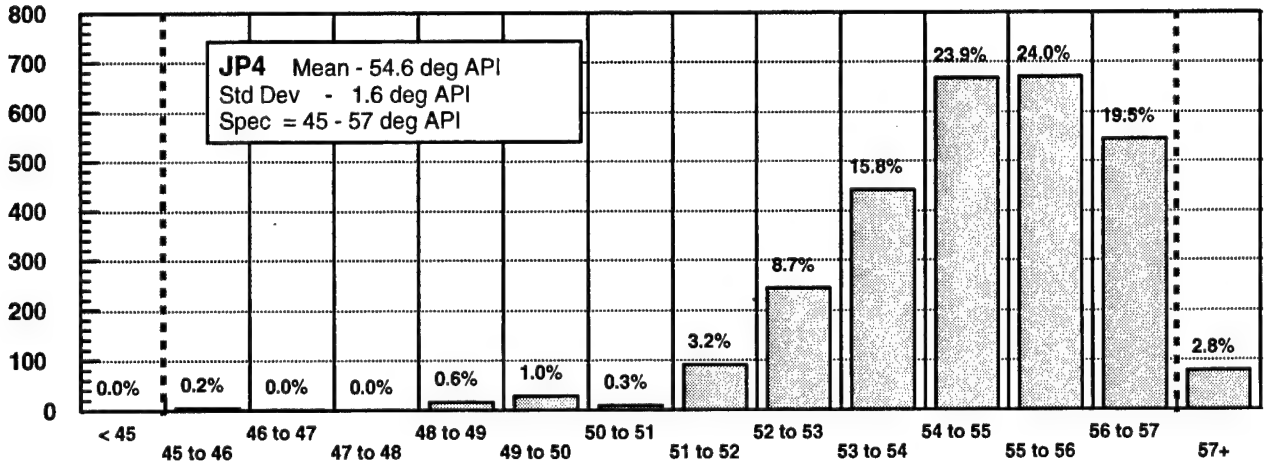
Created in Harvard Chart XL, each histogram shows, for each product and fuel characteristic, the percent by volume of product refined for delivery to the US Government over the entire six years of data for all locations worldwide. The grade of fuel and specification value is indicated in the block within the chart, along with the mean and standard deviation values. Harvard Chart XL automatically calculated the mean and standard deviation. The percentages above the bar represents the percent of total volume of data falling within the data ranges indicated on the x-axis. Heavy dashed lines in the graph represent specification values. To insure all data is included, the first and last bars, where appropriate, have an allowance for data outside of the ranges upon which the histograms are based. A "<[low value]" indicates all occurrences of volumes less than lower range [low value] and a "[high value]+" indicates all occurrences of volumes greater than the upper range [high value]. All six years of data are included to provide the maximum number of data points for use in the charts.

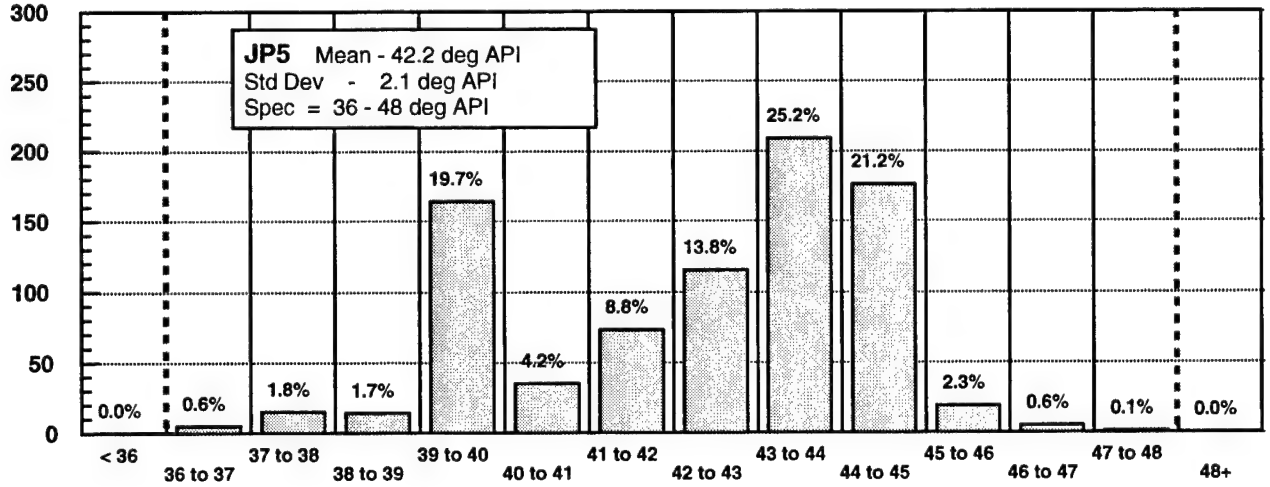
The data indicates the overall distribution of test results on a worldwide basis for the past six years. For some physical and chemical characteristics, more than one method is authorized by the specification. No attempt was made to separate results by the test method used where more than one method was possible, although this also can be done if requested.

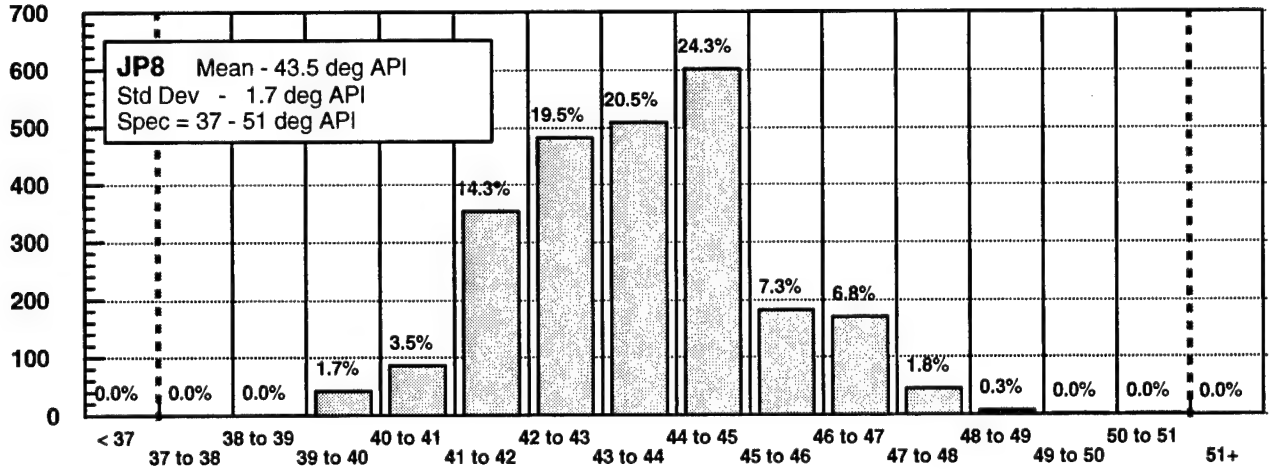
## *Chart 8*

# Distribution of API Gravity by Volume Received

(Millions of Gallons)



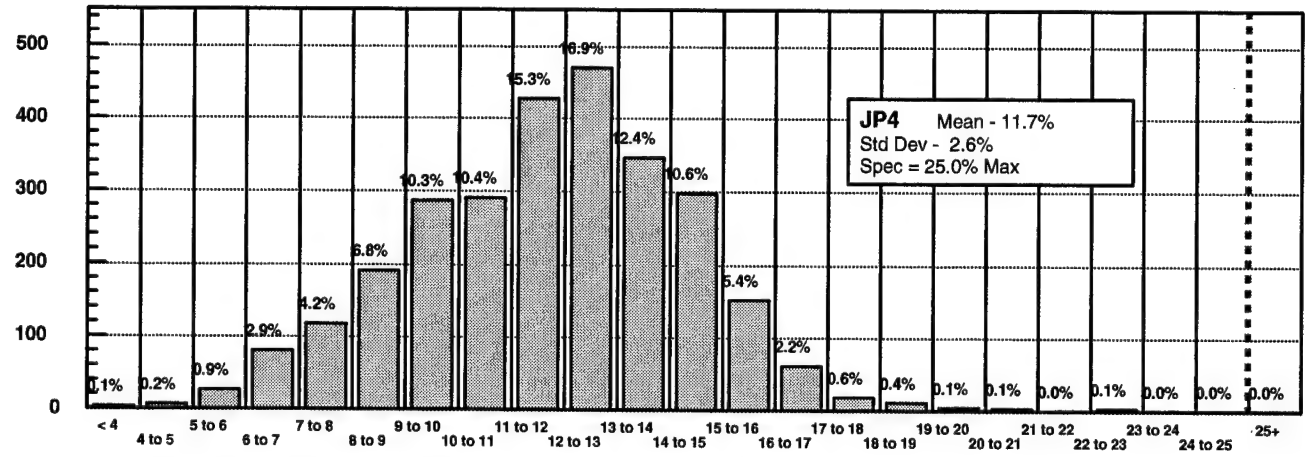



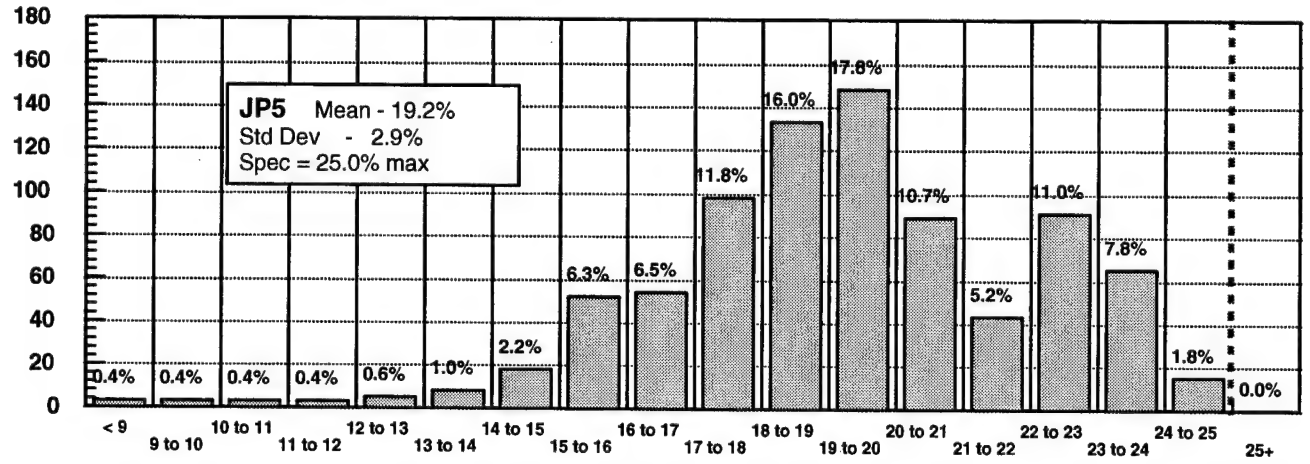

NATO/CEPS JA1 - "The mean was 799 kg/m$^3$" (45.5$^o$ API).

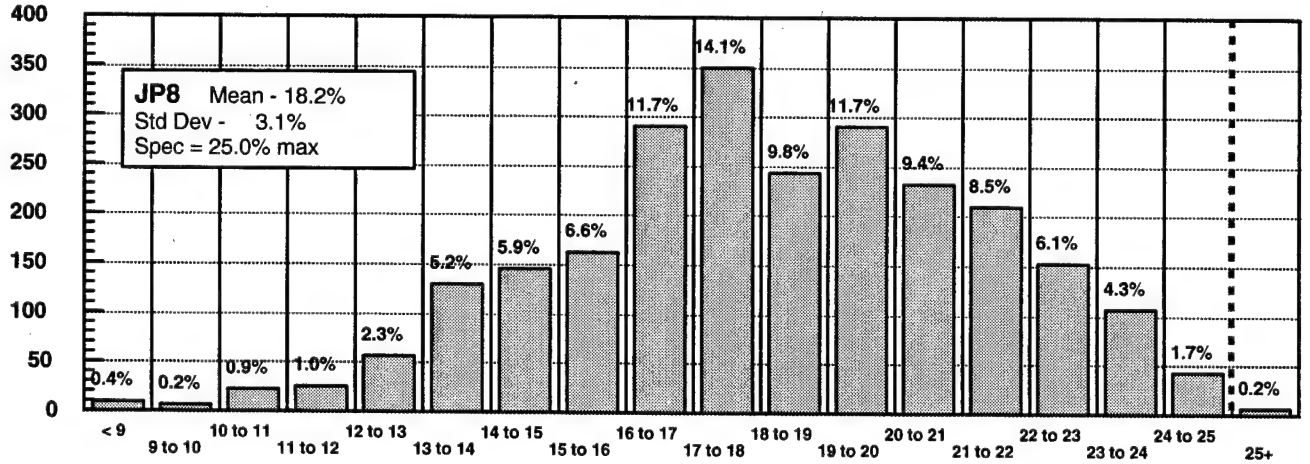
## *Chart 9*

# Distribution of Aromatics by Volume Received

(Millions of Gallons)



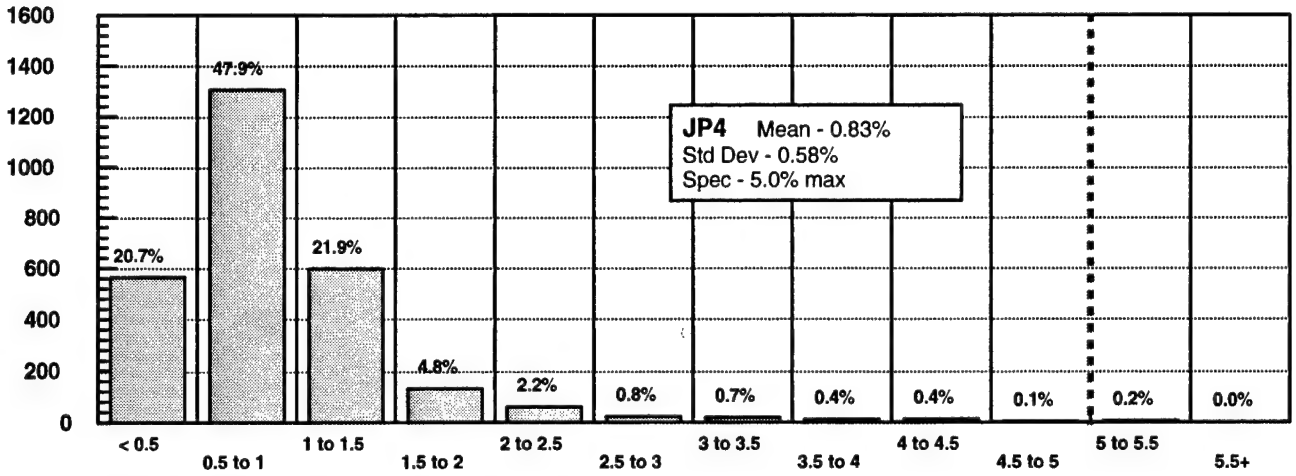



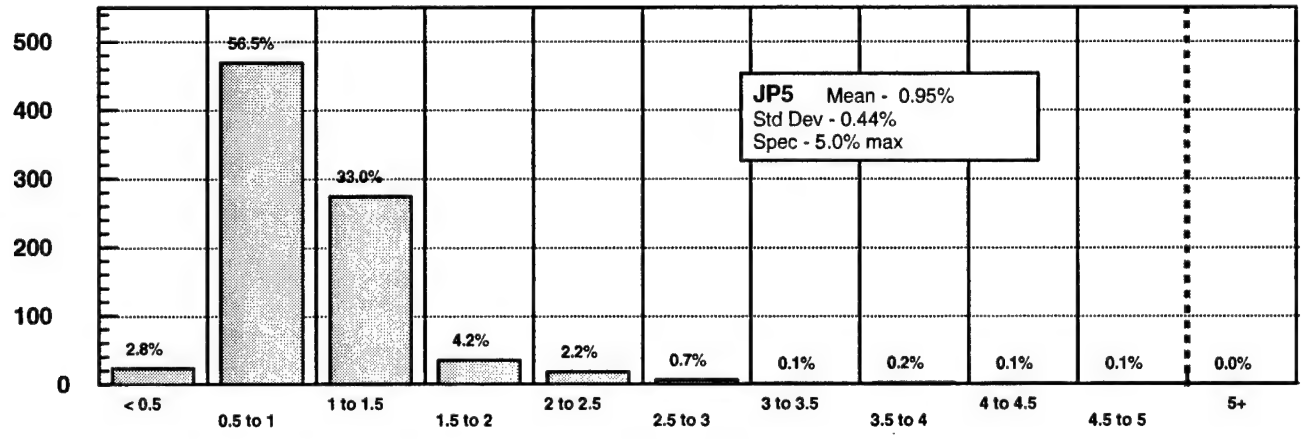

NATO/CEPS JA1 - "The mean was 18.2% vice the specification limit of 22% (or 25% when hydrogen was reported). There were 19 batches greater than 22%. There were two batches at 24%, which were the highest reported values."

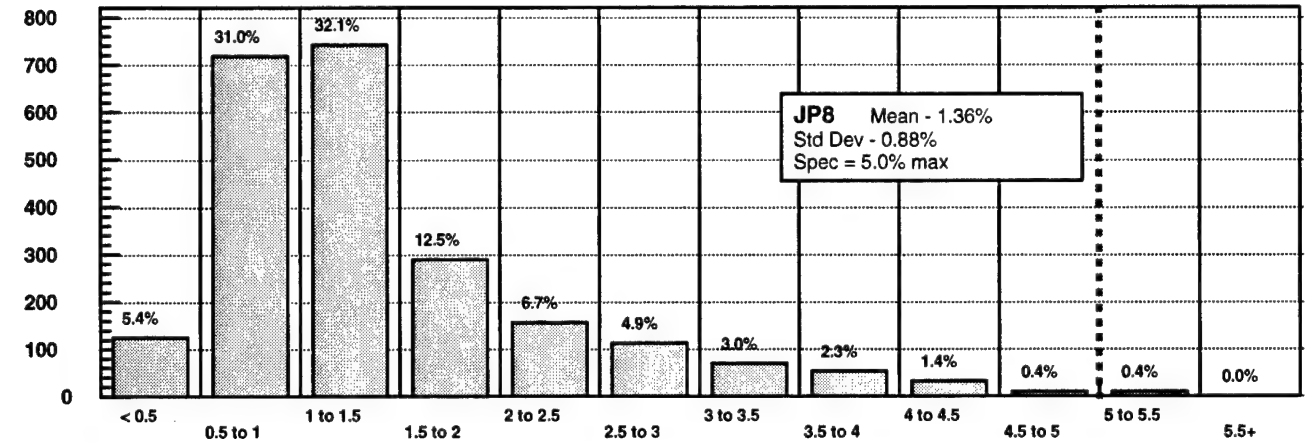
## *Chart 10*

# Distribution of Olefins by Volume Received

(Millions of Gallons)



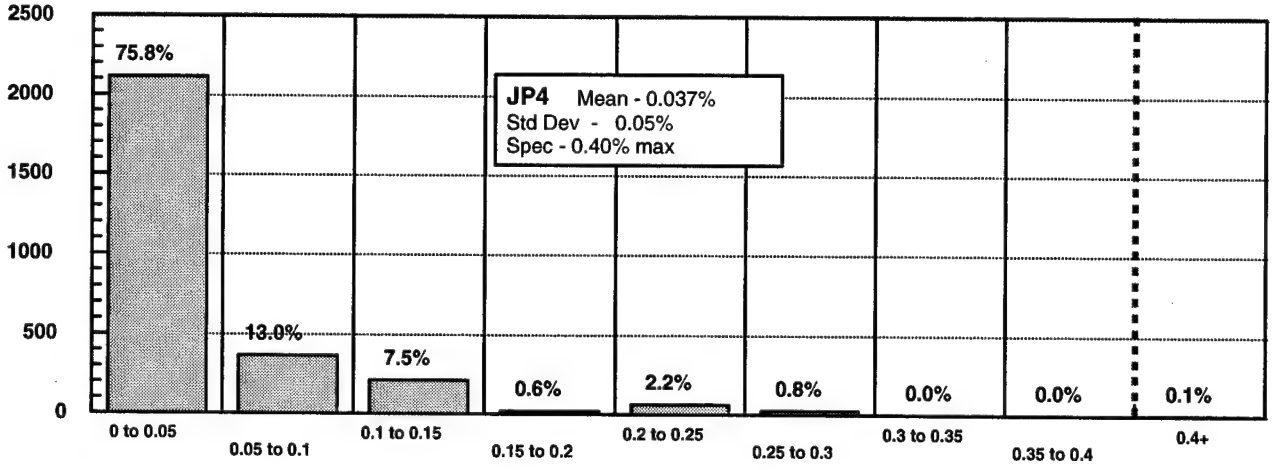



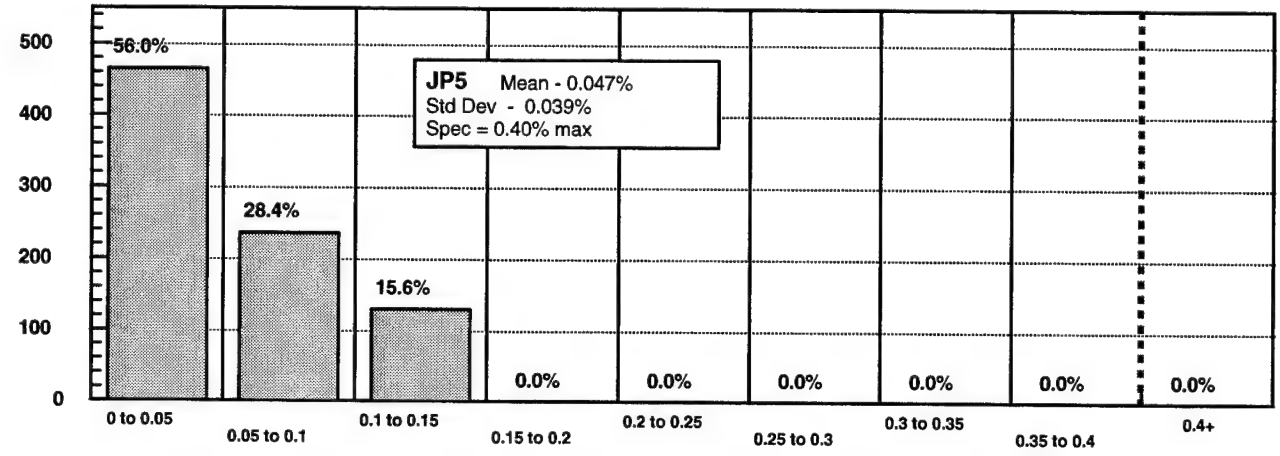

NATO/CEPS JA1 - "The mean of 0.8% is well below the maximum value of 5.0%. Only 9 values were reported greater than 3%, with the highest value equal to 4.7%."

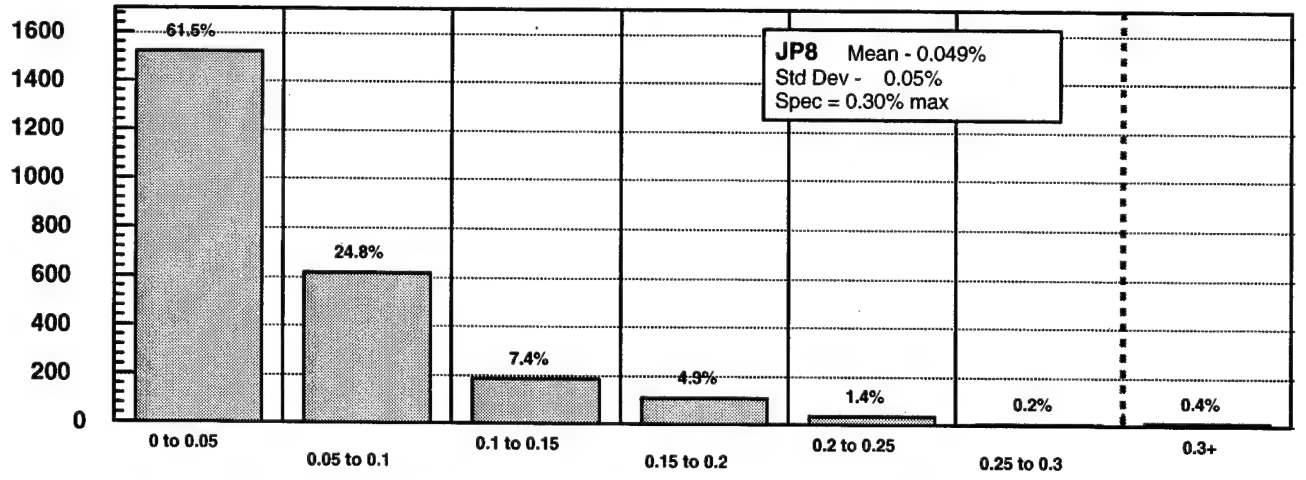
## *Chart 11*

# Distribution of Total Sulfur by Volume Received

(Millions of Gallons)



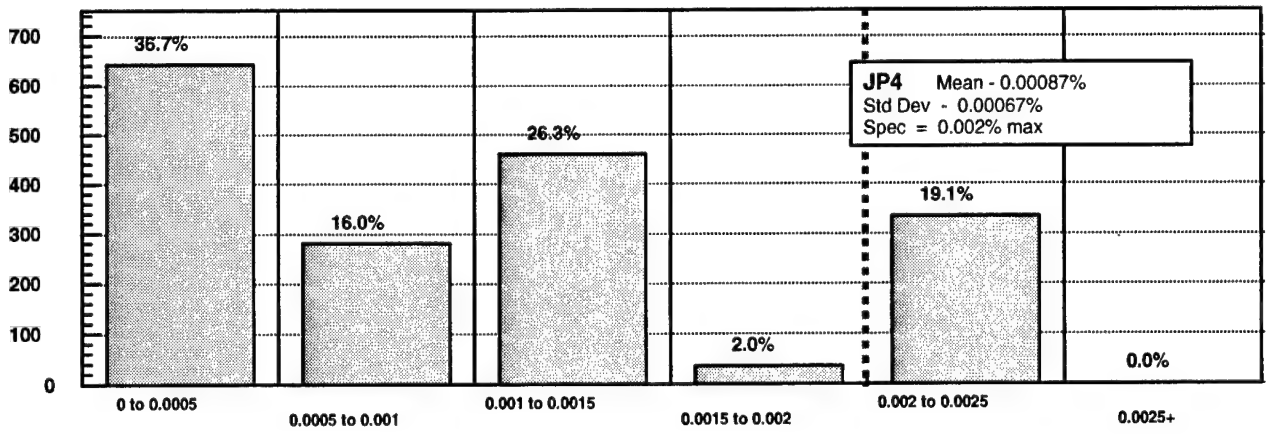



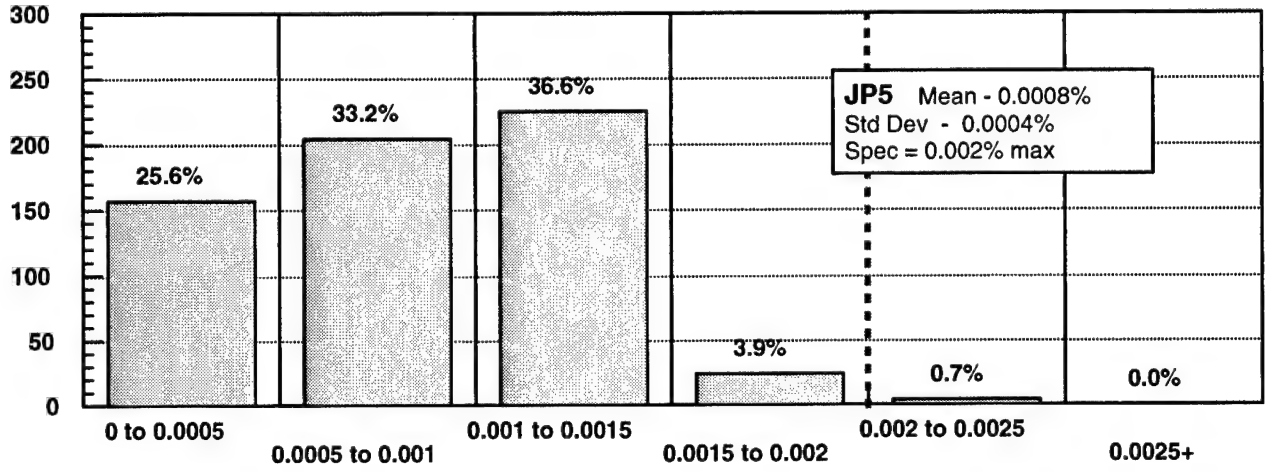

NATO/CEPS JA1 - "The mean of 0.06% is comfortably below the specification limit of 0.3. However, there were 89 batches that exceeded 0.20%. The highest reported value was 0.26%".

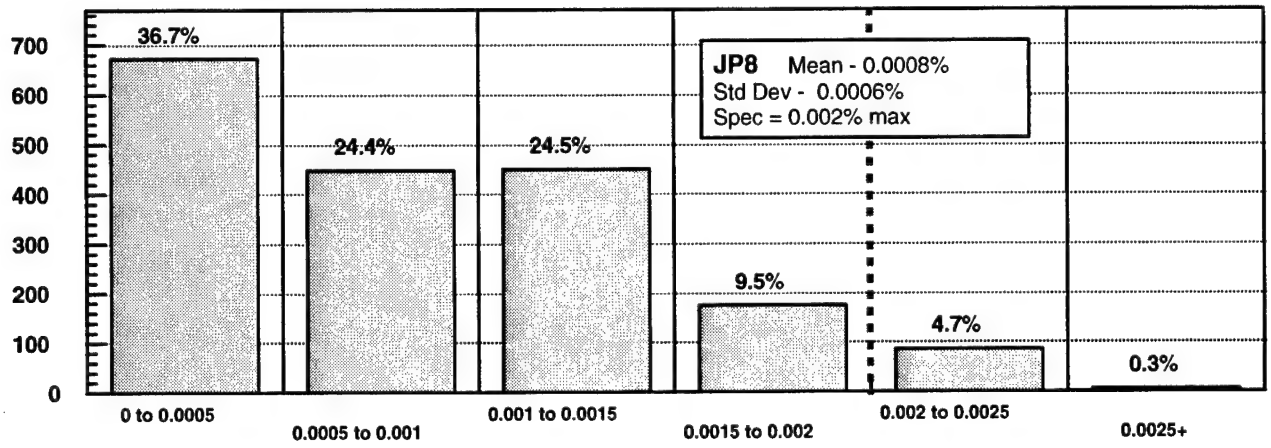
*Chart 12*

## Distribution of Mercaptan Sulfur by Volume Received

(Millions of Gallons)



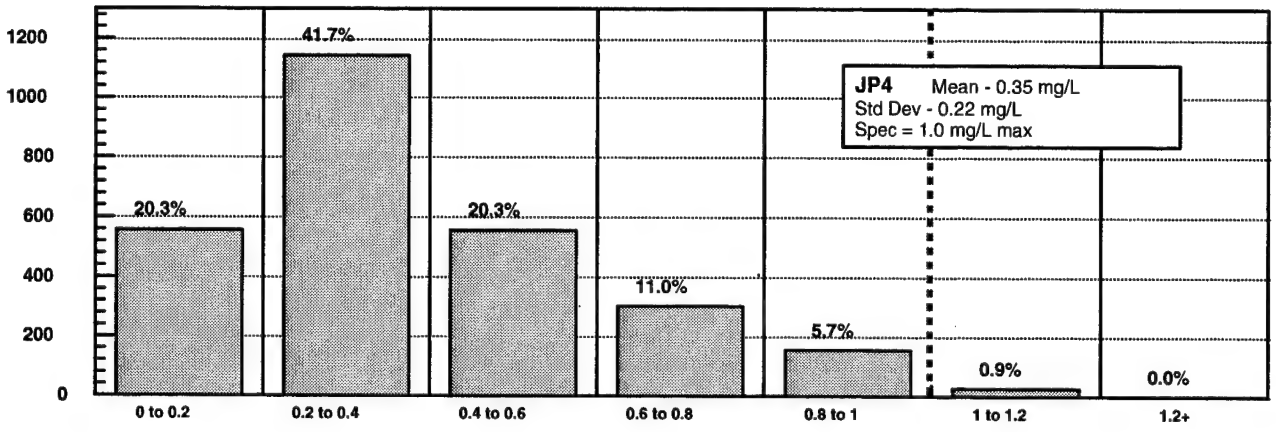



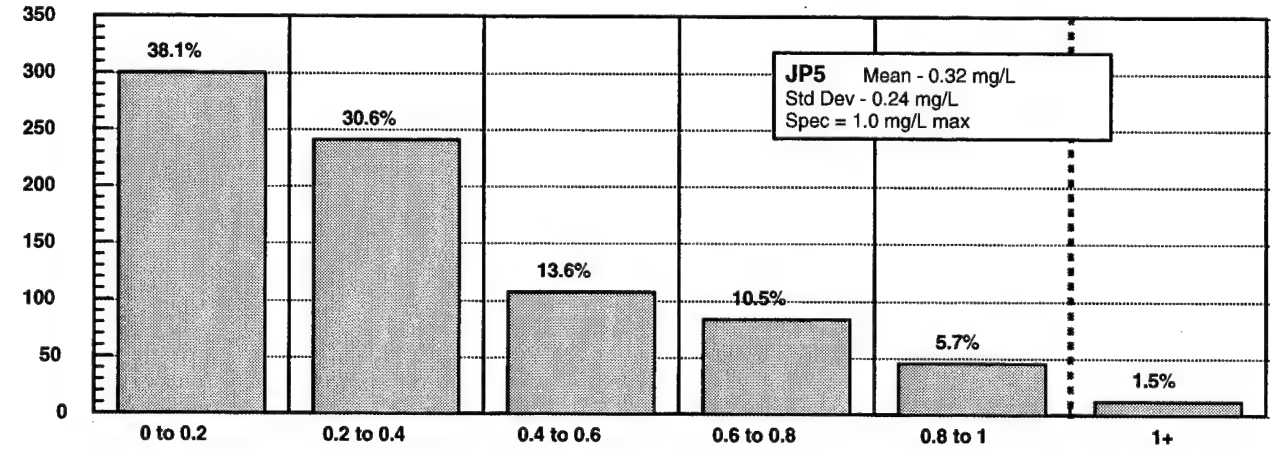

NATO/CEPS JA1 - The mean was 0.0008% mass compared to a maximum limit of 0.003%. There were 64 values at the limit from one source.

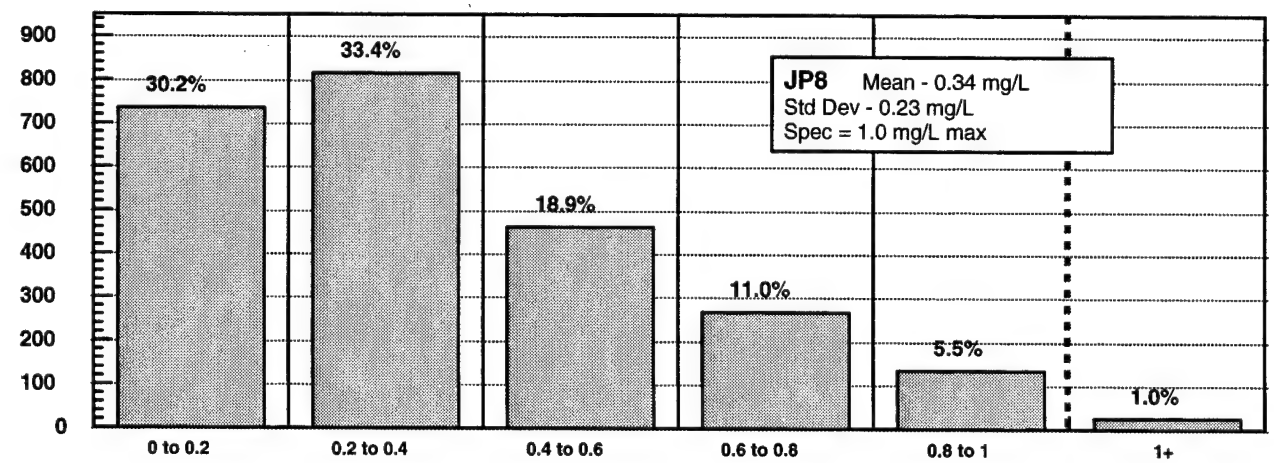
## *Chart 13*

# Distribution of Particulate Contamination by Volume Received

(Millions of Gallons)



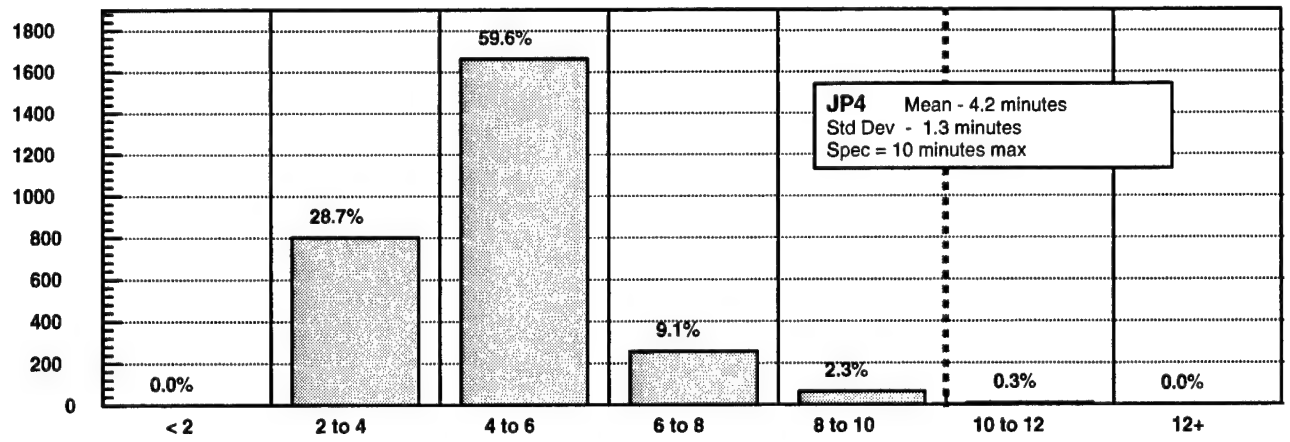



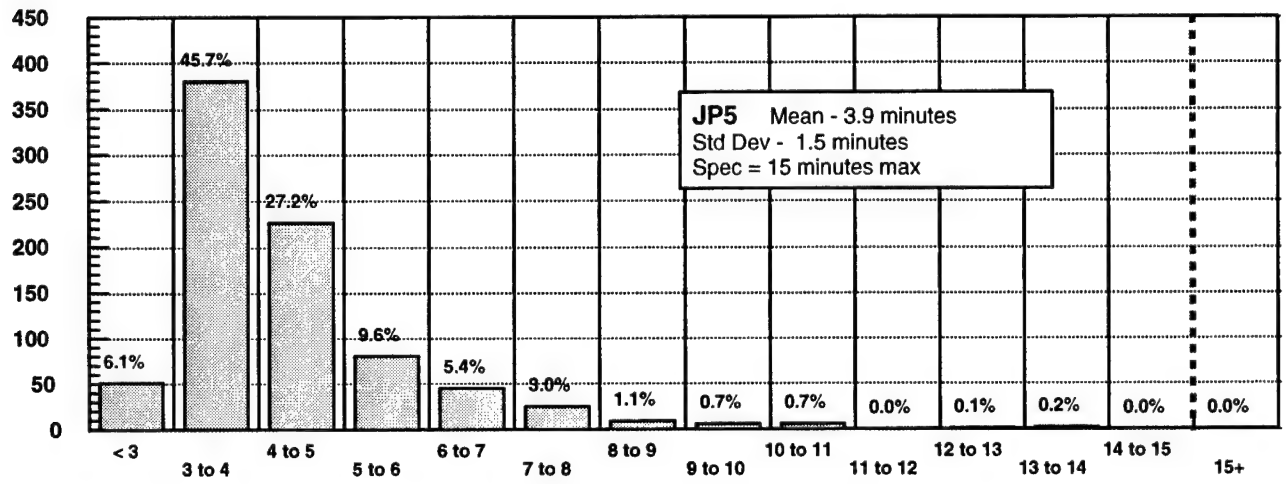

NATO/CEPS JA1 data not reported. Not a specification requirement

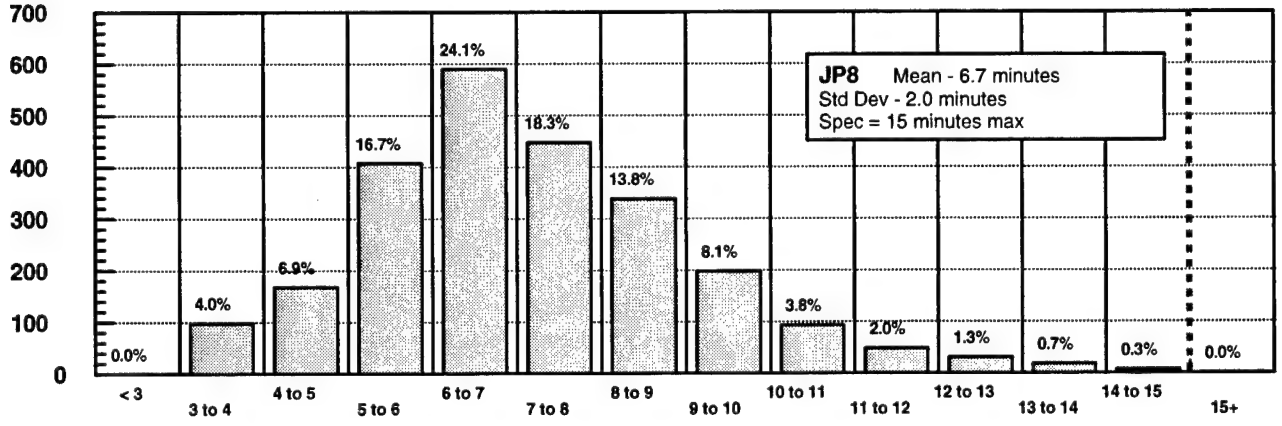
## *Chart 14*

# Distribution of Filtration Time by Volume Received

(Millions of Gallons)



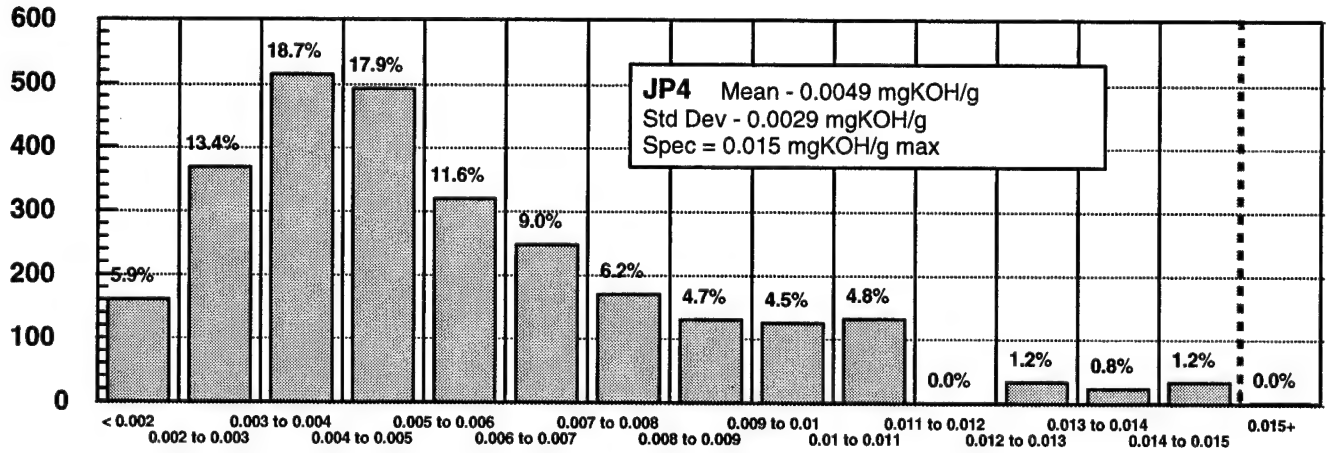



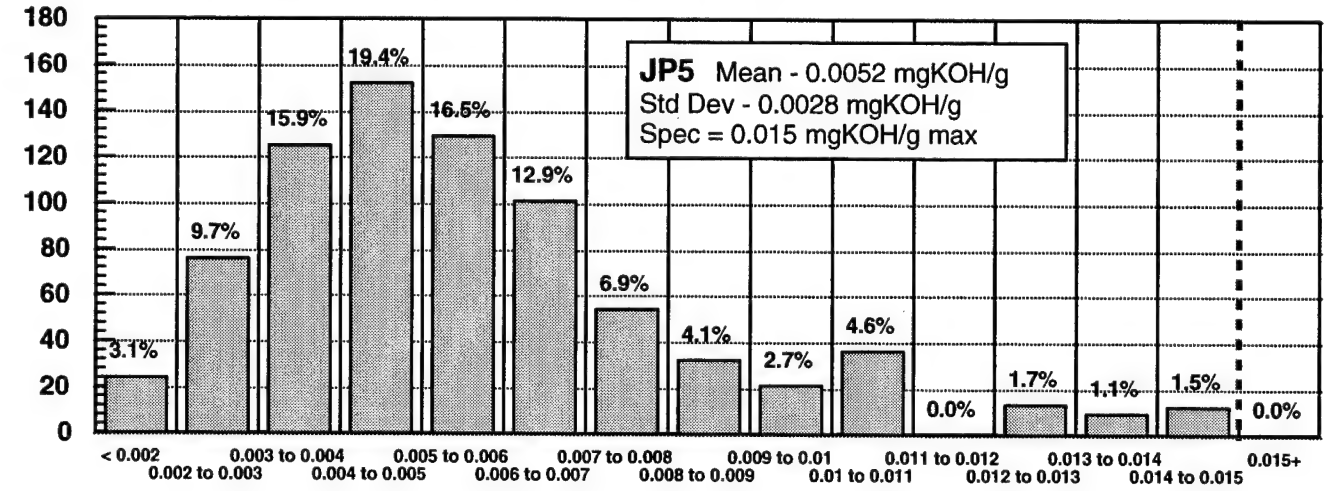

NATO/CEPS JA1 data not reported. Not a specification requirement.

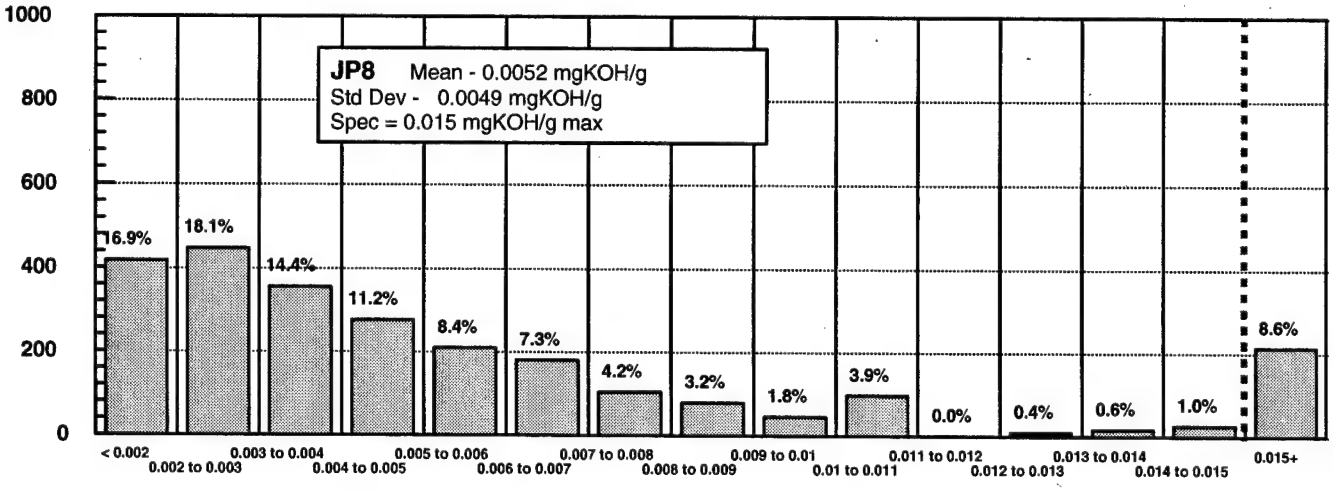
## *Chart 15*

# Distribution of Total Acid Number by Volume Received

(Millions of Gallons)



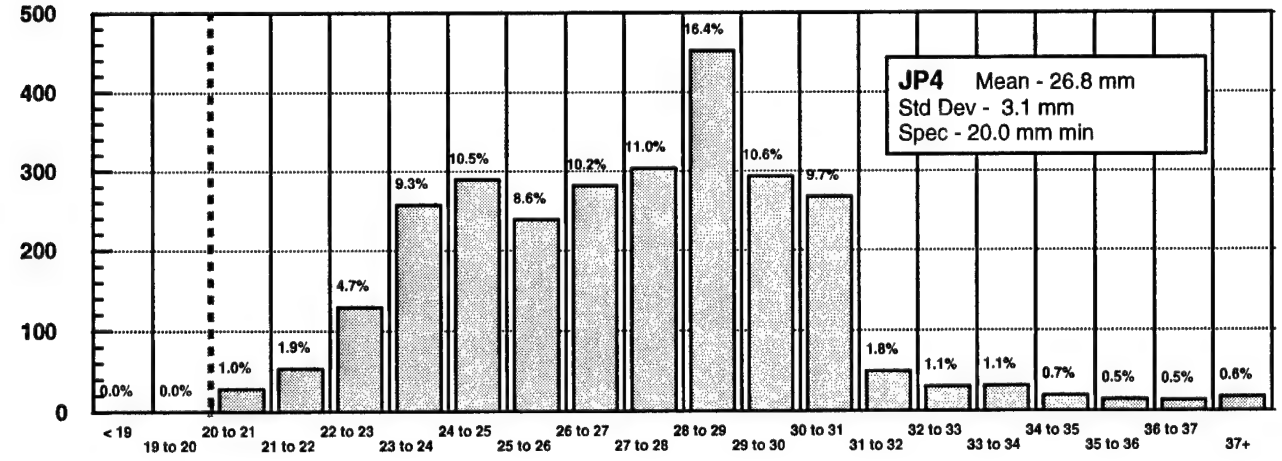



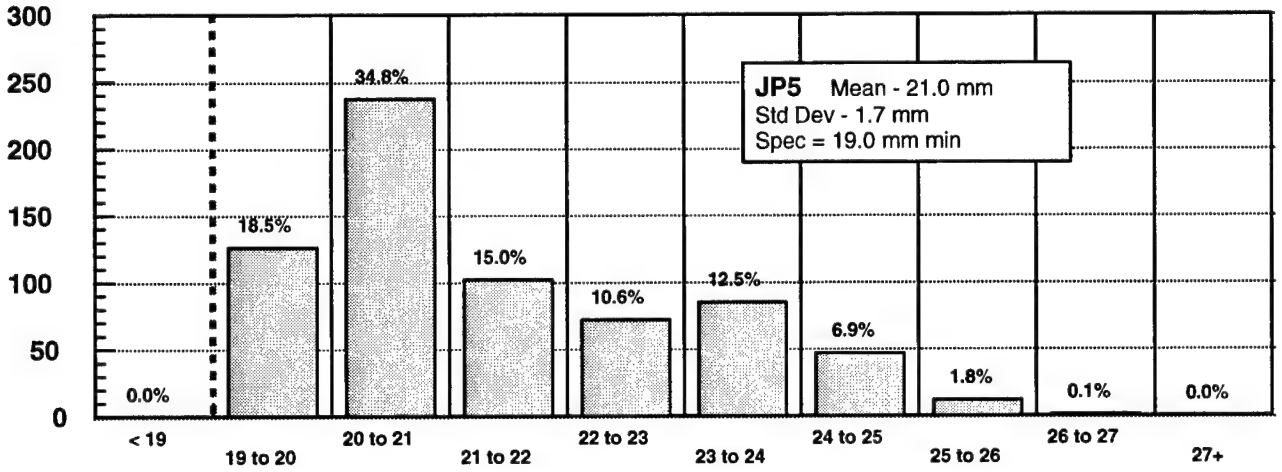

NATO/CEPS JA1 - "The mean value of 0.003 mgKOH/g is well below the specification limit with only one batch reported at the maximum allowable value of 0.015."

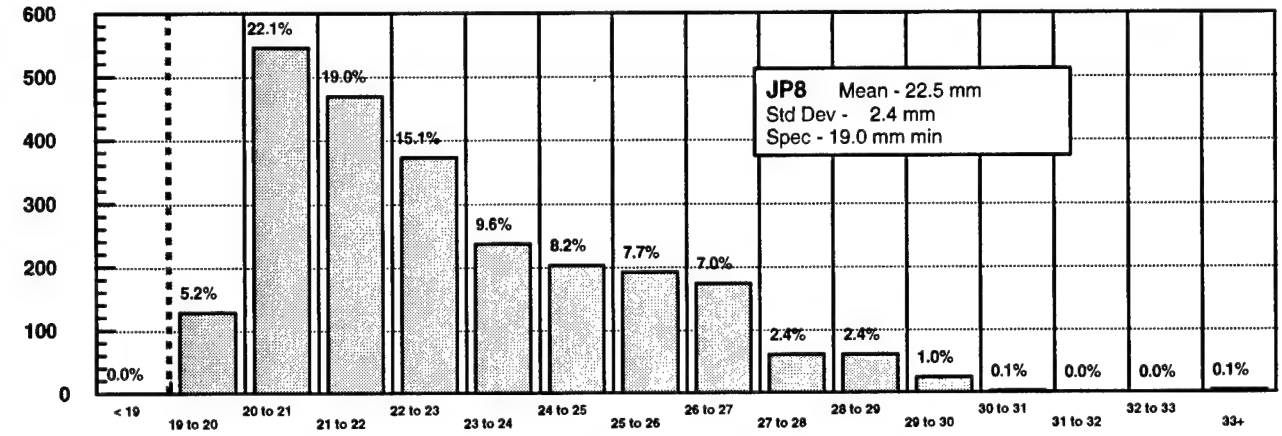
## *Chart 16*

# Distribution of Smoke Point by Volume Received

(Millions of Gallons)



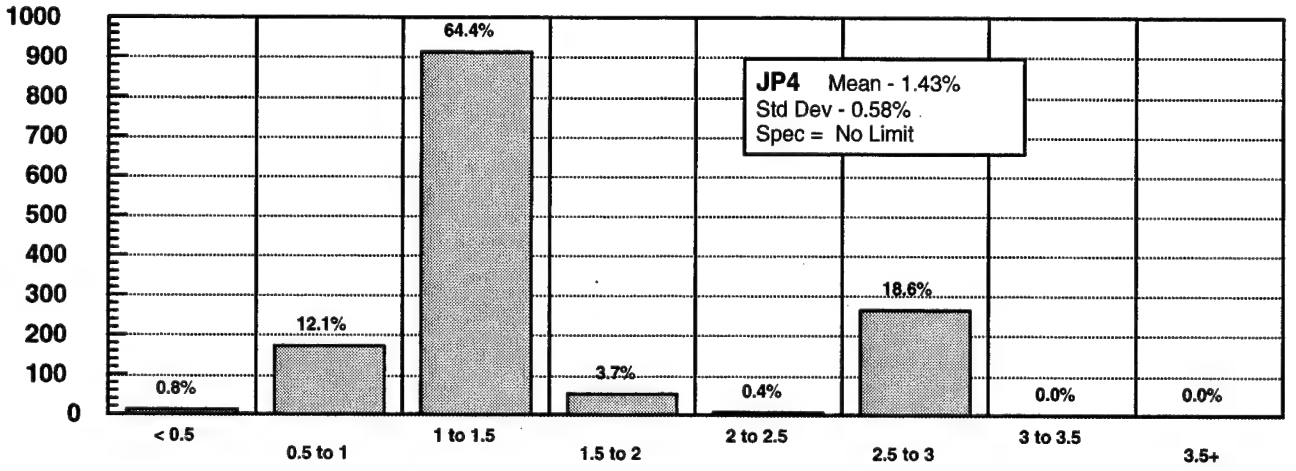



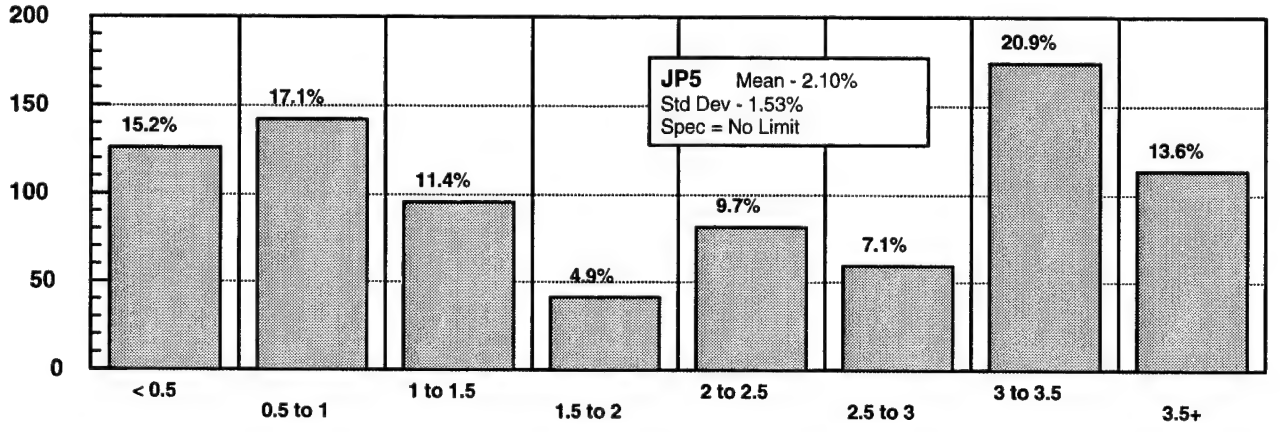

NATO/CEPS JA1 - "The mean was 24 mm with a minimum specification value of 25 mm. Values are permitted as low as 19 mm when the naphthalene content is not greater than 3.0%. There were 16 batches reporting values at 19 mm. All naphthalene values were less than 3.0%."

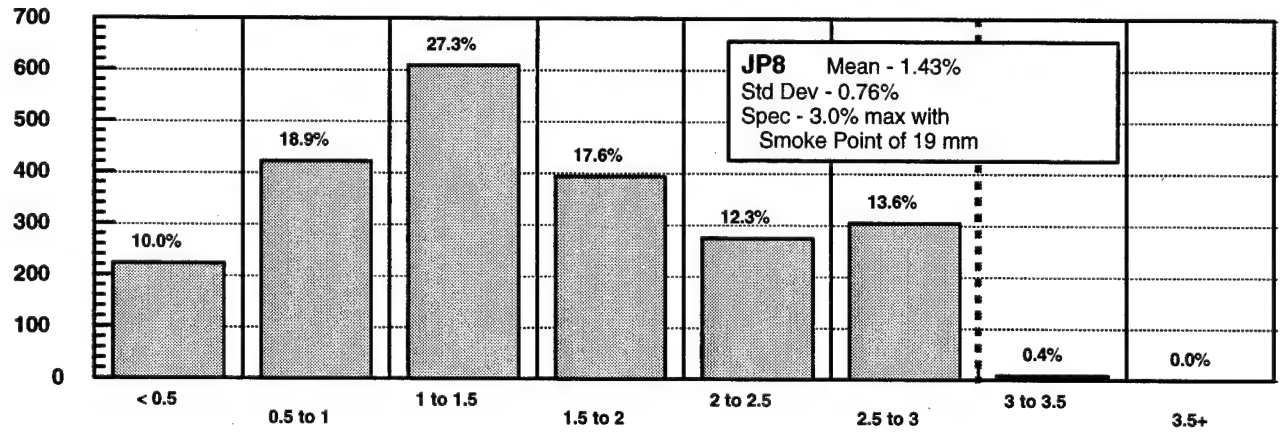
## *Chart 17*

# Distribution of Naphthalenes by Volume Received

(Millions of Gallons)



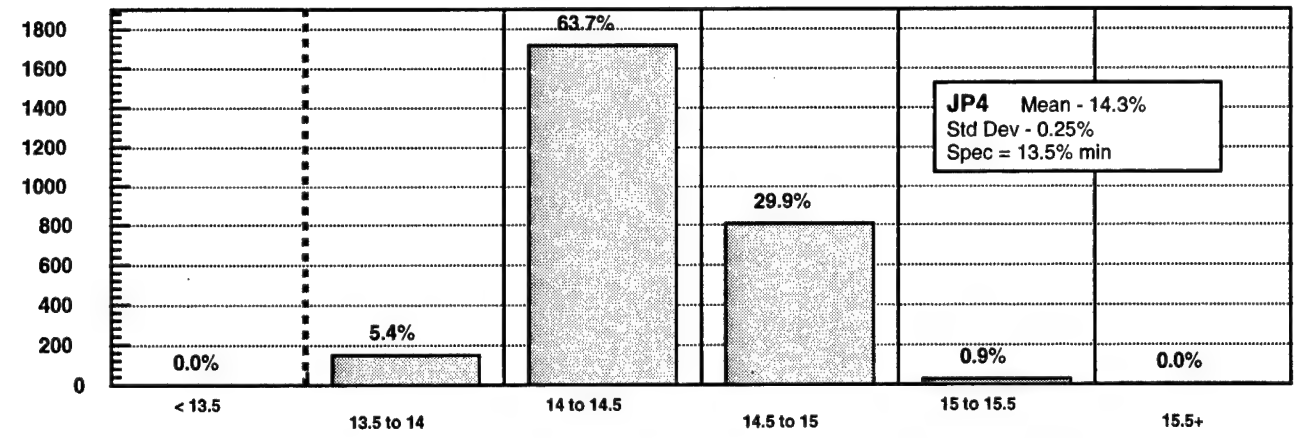



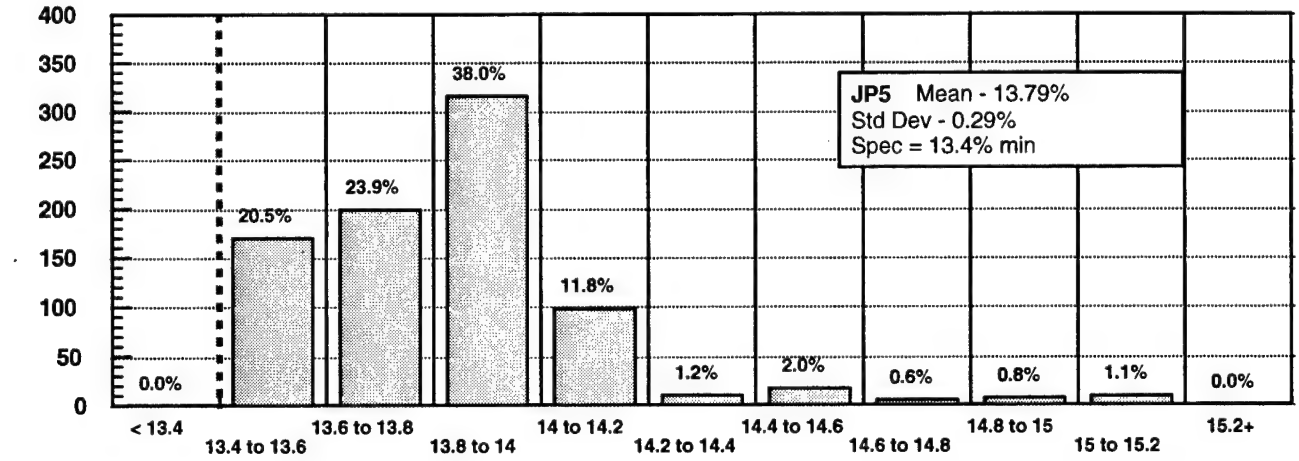

NATO/CEPS JA1 - "There were 940 batches that provided the naphthalene content. The mean was 1.2%, and the 4 maximum values were at 2.70%."

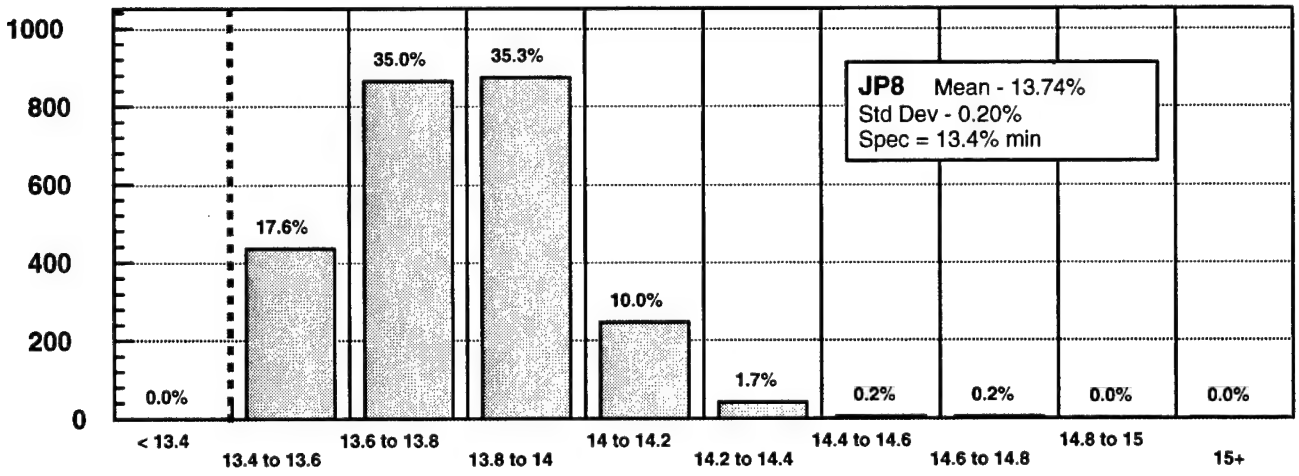
*Chart 18*

# Distribution of Hydrogen Content by Volume Received

(Millions of Gallons)



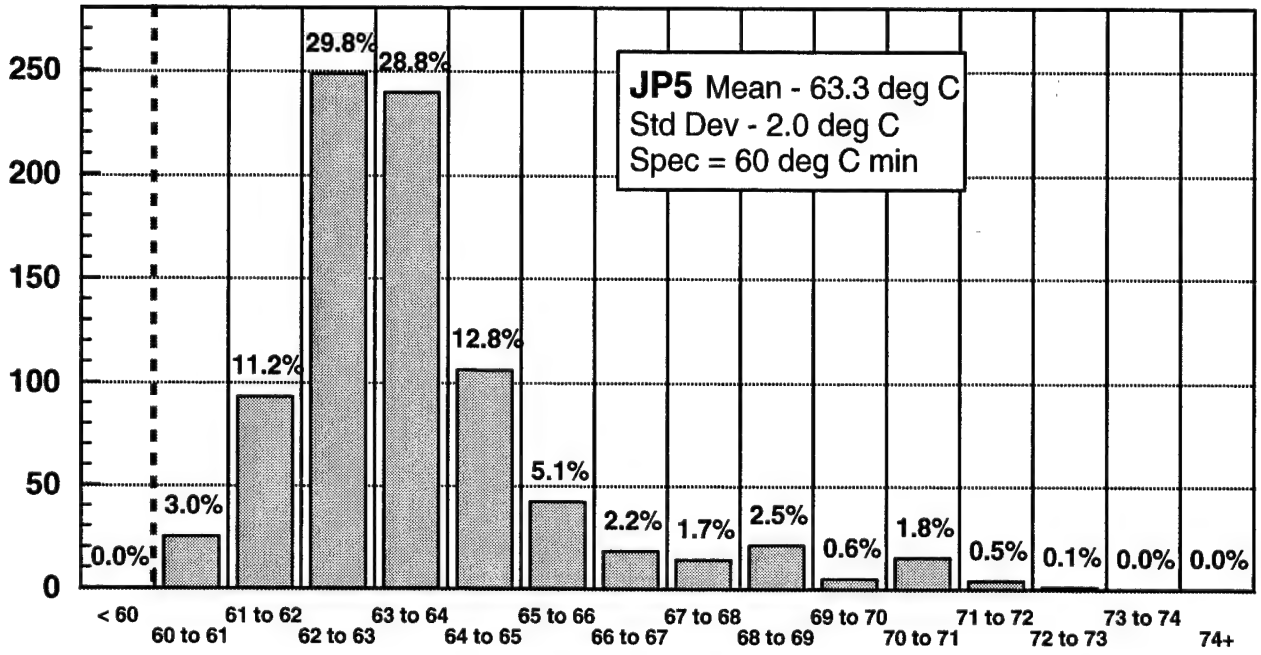



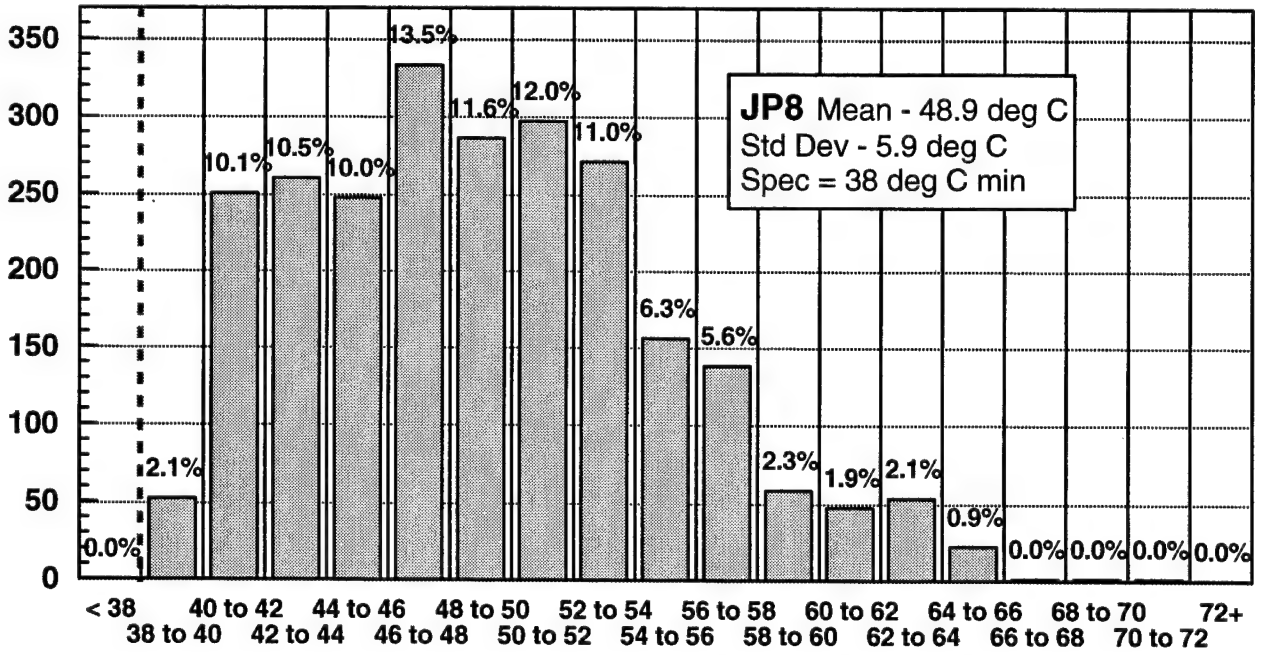

NATO/CEPS JA1 - "The values for 931 batches were reported with a mean of 13.7 percent mass."

*Chart 19*

## Distribution of Flash Point by Volume Received

(Millions of Gallons)



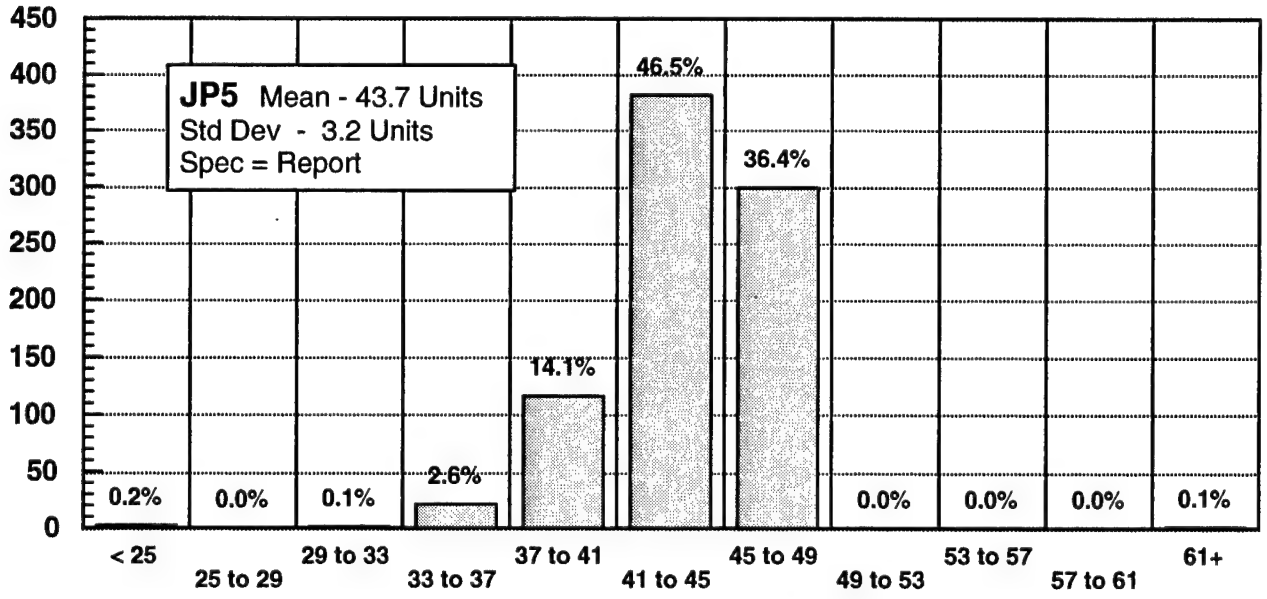



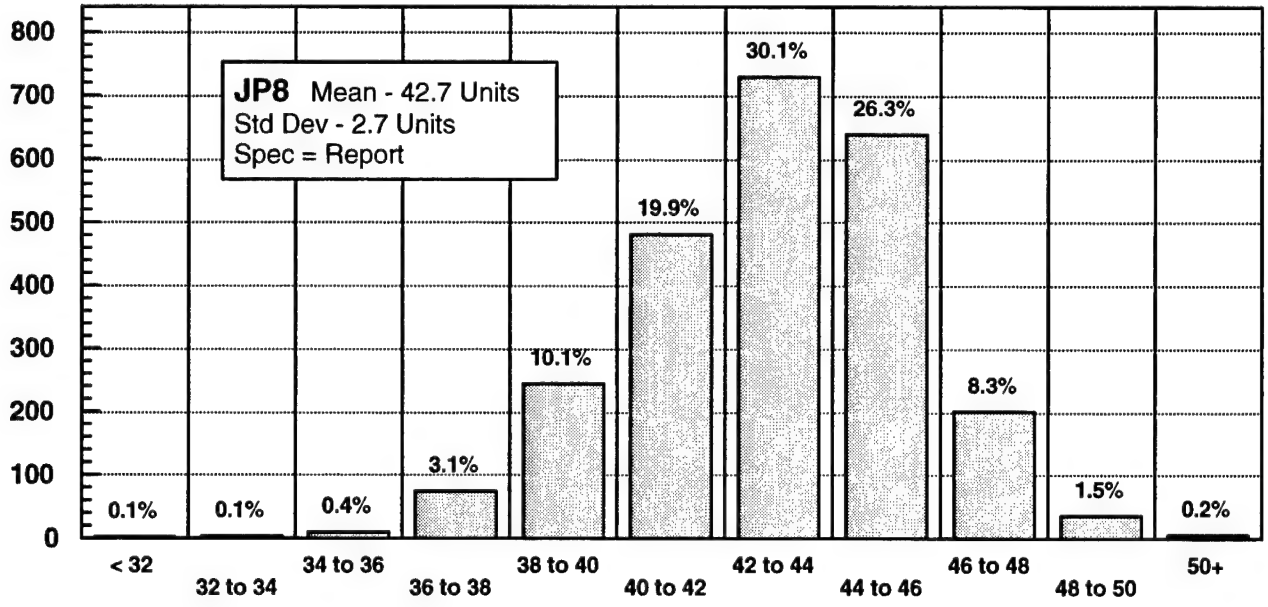

NATO/CEPS JA1 - "The mean value was 43.6°C, compared to a minimum specification limit of 38°C. Twenty batches were at the limit of 38°C."

*Chart 20*

## Distribution of Cetane Index by Volume Received

(Millions of Gallons)




NATO/CEPS JA1 data not reported. Not a specification requirement.

## Section IV - Conclusions

This is the first annual PQIS report to be published since the inception of the database. Many DESC personnel contributed to its development, maintenance and data entry functions. As *Chart 3* shows, with the exception of 1995, PQIS is capturing an increasing percentage of volume purchased for JP8. The percentage is the volumes reported in PQIS compared against the volumes reported in DFAMS, which should represent actual purchase figures for each line item under each contract. This comparison is based on the assumption that DESC would receive copies of DD-250-series documents for all contracts represented by the DFAMS figures. Verifying this assumption would involve reviewing each individual contract in PQIS and DFAMS and verifying quantities received for each calendar year for each of these contracts. If this assumption is false, then 100% total compliance will not be reached, but the compliance rate should be close to 100%. It is essential that PQIS therefore be linked to DFAMS and to the new FAS system in order to make this comparison. For this report, data accumulated through the normal mail-in requirement is published. For the next report, an attempt will be made to complete CY 1996.

For those properties which are directly related to hydrocarbon composition, such as *API Gravity*, *Aromatics*, *Filtration Time*, *Smoke Point*, *Naphthalenes* and *Hydrogen Content*, the shape of the curve created by the bars in the histogram occurs in different data ranges in JP4 than for JP5/JP8. This demonstrates that the type of fuel being produced affects the differences in properties. The properties of *Olefins*, *Total Sulfur*, *Mercaptan Sulfur* and *Acid Number*, are consistent for JP4, JP5 and JP8, thus showing that these properties are controlled by the refining process techniques. Olefins are a side product of the various cracking and reforming reactions used to increase the useable portion of crude oil, and would thus be expected to fall into the latter category.

In the Appendix are Tables, which provide the minimum, average, weighted average and maximum values for a product property by fuel grade, year, and region. These Tables are used as a supplement to the histograms in Section II. This report provided three means for reporting a mid-range test result for each property for each Region and calendar year: the mean, the average and the volumetrically weighted average. Each calculation is based on a different focus, thus producing different results. Analysis of individual properties is provided below.

## API Gravity

Data shows that all JP5 and JP8 reported were purchased within the specification range. Of the JP4 purchases, 2.8% of the volume was at the maximum API Gravity of 57.0°API (Table 1), which occurred in regions producing high API Gravity product. Table 3 provides regional values for API Gravity for JP8. The mean value for Region 7 (Europe) compares favorably to the mean for CEPS JA1.

## Aromatics

Data shows that all JP4 and JP5 reported were purchased within specification. Of the JP8 purchases, 0.2% of the volume was at the maximum of 25.0%, purchased in Region 5 for 1993. In general, the JP4 curve shifts to lower values than the JP5/JP8, showing JP4 to be less aromatic. Comparing Region 7 (Europe) to information from the CEPS JA1, the means compare favorably.

## Olefins

Data shows that all of the JP5 reported was purchased within specification. Of the JP4 and JP8 purchases, over 99% of the purchases were below 5.0%, with 0.7% of the volume at the limit of 5.0%. The mean of 0.8% for CEPS is greater than average of 0.64% for Region 7 (Europe). The CEPS product was spread out over a greater range (0.1 - 4.7%) than for Region 7 in 1996 (0.2 - 1.3%). For JP4 (Table 7), Region 2 had roughly double the olefinic content than either Regions 3 or 4. For JP5 (Table 8), Region 5 has twice as much content than Region 3.

## Total Sulfur

Data shows that all of the JP5 reported was purchased within specification. Over 99% of JP4 and JP8 were under the specification limits. For JP4, Region 2 reported values at the limit of 0.40% for 1993. For JP8, Regions 3 and 7 reported values at the limit of 0.30%. The median value for CEPS (0.06%) was lower than for Region 7 (Europe) in 1996 (0.079%).

## Mercaptan Sulfur

This test is not required if the Doctor Test is "Negative". The data presented would therefore be a subset of the total data points. For JP4 and JP5, no values were above 0.0020%. For JP8, 4.7% of the volume purchased was between 0.0020% and 0.0025%, with approximately 99% of the values at the limit of 0.0020%. From Table 15, values of JP8 above 0.0020% appear in Region 7 (Europe), with the average values in JP8 for Region 7 increasing over time. The mean of CEPS JA1 (0.0008%) is less than the average for what is purchased for the military in Region 7 for 1996 (0.0013%).

## Particulate Contamination

Data shows that the mean values for JP4, JP5 and JP8 were about the same with similar standard deviations. About 60% of the volume purchased had a particulate contamination below 0.4%. Using the JP8 mean of 0.34%, the US Government purchased 2.99 million grams (6,578 pounds) of sediment on average from reported shipment during 1990 - 1996.

## Filtration Time

Data shows that all JP5 and JP8 were purchased within the specification limits for filtration time. For JP4 (Table 19), there was one instance of a filtration time of 13 minutes accepted by DESC waiver representing a volume percentage so small that the bar did not show up on the graph. Other values within the range of 10 - 12 were at the maximum of 10 minutes.

## Total Acid Number

Data shows that all of the JP4 and JP5 were purchased within the specification limits for total acid number. For JP8 (Table 24), acid number which exceeded the specification were reported from Region 8 for all years. The mean acid numbers for all three products are similar. For CEPS JA1, the mean of 0.003 mgKOH/g is less than the average for Region 7 in 1996 (0.0052%).

## Smoke Point

Data shows that all product purchased was within the specification limit for smoke point. The JP8 specification allows a reduction from 25-mm minimum to 19-mm minimum for fuel having a naphthalene content of 3.0% maximum. About 66% of the JP8 purchased were between 19 - 25 range. The CEPS JA1 mean of 24 mm compares favorably with the Region 7 1996 average of 25.3 mm.

## Naphthalenes

Naphthalenes are reported for JP8 only when the smoke point is below 25 mm. Graphs in Chart 17 show all fuel shipments for which naphthalenes were reported. Only the JP8 values for region and year are detailed. Table 28 shows that all JP8 was purchased within the specification limits.

## Hydrogen Content

Data shows that all products were purchased within the specification range for hydrogen content. The mean values for JP4 (14.3%), JP5 (13.8%) and JP8 (13.7%), with JP5 and JP8 close. Since JP4 has a lower aromatic content, JP4 would be expected to have a higher hydrogen content, since the lower aromatic content would mean a higher percentage of saturated hydrocarbons.

## Distillation

Distillation results were reported from Table 32 - Table 38 for those distillation requirements, which have a limiting value. No obvious trends are apparent.

## Flash Point

The flash point is required only for JP5 and JP8. Data shows all product purchased within specification limits. The mean flash point for JP5 was 63.3°C and was 48.9°C for JP8. Flash Point for JP5 did not exceed 72°C. For JP8 (Table 40), Region 5 in 1992 seemed to have used the same product for JP5 and JP8.

## Cetane Index

The cetane index is a report only requirement. The JP5 mean is 43.7 and the JP8 mean is 42.7. The JP8 is more tightly centered on the mean than the JP5 with most of the data falling between a cetane index of 37 to 49.

## Net Heat of Combustion

The Net Heat can be reported in three different ways: the Aniline-API Gravity product or net heat reported in either British Thermal Units (BTUs) or in MilliJoules per kg (MJ/kg). Heat Contents are generally higher in JP4 than in either JP5.

## Appendix - Tables of Property Values

The following tables are designed to show the minimum, average, volumetrically weighted average and maximum values for each fuel property of the specified grade of fuel. The values are broken down by year and by region. Also supplied for each year and region combination is the volume, in millions of gallons, represented by the data as well as the number of reports that contained data in the field. These charts are designed to be "stand alone", with all the information contained within each chart to allow it to be separated from the main body of the report and still be useable.

Please note that, as discussed in ***Section I - Specifications***, not all properties are required to be checked if alternatives exists to evaluate the characteristic desired.

Using these charts, it is possible to compare averages from different regions. For example, if a researcher desires a comparison in average API gravity of JP4, the researcher will go to Table 1 - "Values of JP4 for API Gravity by Region" (on the following page) and observe the values for Region 1 (East Coast) and compare those with Region V (West Coast). The researcher would find that the fuel supplied in Region V trends to be lower in API Gravity that the fuel supplied in Region 1. The researcher would then evaluate the significance, if any, of this observation.

In order to accurately assess contractor compliance, the volume of fuel delivered must be known precisely so that the quantity delivered as reported by DFAMS / FAS is comparable to the volume in PQIS. These quantities may not match exactly, since corrections to the DD-250-series documents sometimes involves a quantity shipped correction and may not be adjusted in the PQIS database. A good link must therefore be set between PQIS and FAS to enable quantity comparisons and thereby giving an indication of contractor compliance.

## *Table 1*

### *Values of JP4 for API Gravity by Region*

(Volume in Millions of Gallons)
(Spec = 45 - 57 ° API)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 2 | JP4 | 2.2 | 52.0 | 53.5 | 54.8 | 56.5 | 3 |
| 1990 | 3 | JP4 | 14.4 | 52.3 | 55.7 | 55.8 | 56.9 | 27 |
| 1990 | 4 | JP4 | 28.1 | 54.2 | 55.3 | 55.4 | 57.0 | 33 |
| 1990 | 5 | JP4 | 53.3 | 50.8 | 54.0 | 54.6 | 55.7 | 28 |
| 1990 | 8 | JP4 | 11.2 | 55.1 | 55.9 | 55.8 | 56.5 | 8 |
| 1991 | 1 | JP4 | 46.4 | 54.2 | 56.0 | 56.1 | 56.7 | 36 |
| 1991 | 2 | JP4 | 200.0 | 51.1 | 53.8 | 53.8 | 56.5 | 166 |
| 1991 | 3 | JP4 | 803.8 | 51.0 | 55.0 | 55.5 | 57.0 | 409 |
| 1991 | 4 | JP4 | 55.0 | 53.3 | 54.8 | 54.7 | 56.8 | 93 |
| 1991 | 5 | JP4 | 190.4 | 48.7 | 53.5 | 53.7 | 56.0 | 96 |
| 1991 | 8 | JP4 | 59.5 | 54.1 | 56.2 | 56.3 | 56.8 | 43 |
| 1992 | 1 | JP4 | 21.2 | 55.8 | 56.6 | 56.6 | 57.0 | 17 |
| 1992 | 2 | JP4 | 134.9 | 51.1 | 54.2 | 54.5 | 56.8 | 107 |
| 1992 | 3 | JP4 | 502.2 | 50.9 | 54.5 | 54.9 | 57.0 | 354 |
| 1992 | 4 | JP4 | 29.4 | 52.2 | 55.0 | 55.1 | 56.7 | 78 |
| 1992 | 5 | JP4 | 165.7 | 48.5 | 57.9 | 53.7 | 55.7 | 100 |
| 1992 | 8 | JP4 | 5.3 | 49.6 | 54.0 | 55.1 | 56.3 | 4 |
| 1993 | 2 | JP4 | 149.7 | 52.7 | 55.4 | 54.8 | 56.8 | 84 |
| 1993 | 3 | JP4 | 351.5 | 51.9 | 54.4 | 55.0 | 57.0 | 404 |
| 1993 | 4 | JP4 | 90.2 | 51.0 | 55.3 | 55.4 | 56.9 | 194 |
| 1993 | 5 | JP4 | 80.3 | 48.6 | 53.4 | 54.2 | 56.2 | 85 |
| 1993 | 8 | JP4 | 9.4 | 45.5 | 45.5 | 45.5 | 41.2 | 6 |
| 1994 | 2 | JP4 | 72.0 | 53.0 | 55.7 | 55.4 | 56.8 | 52 |
| 1994 | 3 | JP4 | 27.2 | 53.2 | 54.7 | 55.2 | 56.9 | 18 |
| 1994 | 4 | JP4 | 103.9 | 52.7 | 55.0 | 55.0 | 57.0 | 204 |
| 1995 | 4 | JP4 | 61.9 | 52.6 | 54.5 | 54.5 | 56.7 | 134 |
| 1995 | 7 | JP4 | 4.9 | 56.3 | 56.3 | 56.3 | 56.3 | 1 |
| 1995 | 8 | JP4 | 0.1 | 53.3 | 54.1 | 53.6 | 55.1 | 3 |
| 1996 | 8 | JP4 | 0.7 | 53.2 | 53.4 | 53.3 | 53.6 | 2 |

*Table 2*

## *Values of JP5 for API Gravity by Region*

(Volume in Millions of Gallons)

(Spec = 36 - 48° API)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 3 | JP5 | 15.0 | 41.1 | 41.8 | 41.8 | 42.4 | 6 |
| 1990 | 5 | JP5 | 32.8 | 39.1 | 39.4 | 39.4 | 41.3 | 26 |
| 1991 | 2 | JP5 | 5.9 | 43.7 | 43.9 | 43.9 | 44.2 | 9 |
| 1991 | 3 | JP5 | 298.5 | 40.2 | 43.2 | 42.9 | 45.3 | 145 |
| 1991 | 5 | JP5 | 159.0 | 36.6 | 39.2 | 39.1 | 40.4 | 100 |
| 1992 | 2 | JP5 | 6.0 | 42.5 | 43.4 | 43.4 | 43.9 | 8 |
| 1992 | 3 | JP5 | 232.9 | 40.7 | 42.6 | 42.3 | 45.1 | 105 |
| 1992 | 5 | JP5 | 137.6 | 38.8 | 39.7 | 39.7 | 42.4 | 79 |
| 1993 | 3 | JP5 | 266.9 | 40.7 | 43.8 | 43.8 | 46.8 | 123 |
| 1993 | 5 | JP5 | 5.0 | 37.2 | 37.7 | 37.4 | 38.1 | 3 |
| 1993 | 7 | JP5 | 55.6 | 40.0 | 42.0 | 41.8 | 45.4 | 9 |
| 1994 | 3 | JP5 | 125.4 | 40.3 | 42.7 | 42.7 | 44.6 | 49 |
| 1994 | 7 | JP5 | 23.5 | 41.5 | 43.0 | 43.1 | 45.8 | 7 |
| 1995 | 3 | JP5 | 10.5 | 37.1 | 42.8 | 38.7 | 44.2 | 23 |
| 1995 | 7 | JP5 | 23.1 | 40.8 | 43.4 | 42.9 | 46.5 | 8 |
| 1996 | 3 | JP5 | 240.4 | 37.2 | 43.6 | 43.6 | 47.8 | 98 |
| 1996 | 5 | JP5 | 29.5 | 39.3 | 40.0 | 40.4 | 41.6 | 9 |
| 1996 | 7 | JP5 | 70.6 | 41.2 | 43.9 | 43.9 | 46.8 | 22 |
| 1996 | 8 | JP5 | 9.7 | 44.3 | 44.6 | 44.6 | 45.0 | 2 |

*Table 3*

## *Values of JP8 for API Gravity by Region*

(Volume in Millions of Gallons)

(Spec = 37.0 - 51.0° API)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 5 | JP8 | 4.0 | 39.1 | 39.7 | 39.7 | 41.3 | 7 |
| 1991 | 5 | JP8 | 8.5 | 39.0 | 39.4 | 39.4 | 39.9 | 14 |
| 1991 | 8 | JP8 | 3.9 | 42.7 | 43.7 | 43.7 | 45.2 | 3 |
| 1992 | 5 | JP8 | 4.4 | 39.1 | 39.6 | 39.6 | 40.2 | 7 |
| 1992 | 8 | JP8 | 8.3 | 43.1 | 43.5 | 43.4 | 43.9 | 18 |
| 1993 | 3 | JP8 | 53.9 | 42.1 | 43.9 | 43.4 | 45.0 | 69 |
| 1993 | 5 | JP8 | 118.4 | 41.1 | 41.9 | 42.0 | 43.3 | 66 |
| 1993 | 7 | JP8 | 20.6 | 42.8 | 44.8 | 45.1 | 46.2 | 11 |
| 1993 | 8 | JP8 | 20.6 | 43.0 | 44.1 | 44.5 | 47.0 | 11 |
| 1994 | 2 | JP8 | 28.5 | 42.6 | 44.1 | 44.2 | 44.9 | 20 |
| 1994 | 3 | JP8 | 303.0 | 39.8 | 43.7 | 43.7 | 47.4 | 281 |
| 1994 | 5 | JP8 | 151.1 | 40.6 | 41.7 | 41.8 | 43.6 | 88 |
| 1994 | 7 | JP8 | 5.7 | 46.4 | 46.9 | 47.0 | 47.6 | 3 |
| 1994 | 8 | JP8 | 43.1 | 40.5 | 42.8 | 42.8 | 45.3 | 31 |
| 1995 | 1 | JP8 | 2.9 | 40.9 | 42.8 | 42.9 | 44.7 | 30 |
| 1995 | 2 | JP8 | 126.6 | 42.2 | 44.2 | 44.3 | 45.0 | 83 |
| 1995 | 3 | JP8 | 455.4 | 41.0 | 44.2 | 44.4 | 48.7 | 325 |
| 1995 | 4 | JP8 | 9.9 | 42.8 | 44.8 | 44.7 | 46.8 | 16 |
| 1995 | 5 | JP8 | 239.3 | 39.7 | 41.8 | 42.0 | 44.1 | 154 |
| 1995 | 7 | JP8 | 65.1 | 41.8 | 45.3 | 45.3 | 48.0 | 21 |
| 1995 | 8 | JP8 | 96.4 | 41.9 | 43.0 | 43.1 | 46.1 | 115 |
| 1996 | 1 | JP8 | 18.8 | 41.2 | 42.9 | 44.1 | 45.3 | 61 |
| 1996 | 2 | JP8 | 182.6 | 41.4 | 44.3 | 44.2 | 46.0 | 120 |
| 1996 | 3 | JP8 | 608.8 | 40.5 | 44.1 | 43.9 | 48.2 | 366 |
| 1996 | 4 | JP8 | 76.4 | 42.4 | 45.3 | 45.2 | 47.2 | 81 |
| 1996 | 5 | JP8 | 412.7 | 39.1 | 41.4 | 41.8 | 45.7 | 217 |
| 1996 | 6 | JP8 | 39.9 | 45.6 | 46.1 | 46.1 | 46.3 | 8 |
| 1996 | 7 | JP8 | 259.5 | 40.8 | 45.0 | 45.4 | 48.1 | 106 |
| 1996 | 8 | JP8 | 150.5 | 42.0 | 43.9 | 45.7 | 50.1 | 140 |

NATO/CEPS JA1 Min/Max: "778 - 824 $kg/m^3$" (40.1 - 48.0° API). Mean of 45.5°API.

*Table 4*

## *Values of JP4 for Aromatics by Region*

(Volume in Millions of Gallons)

(Spec = 25.0% max)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 2 | JP4 | 2.2 | 11.4 | 12.6 | 13.5 | 14.8 | 3 |
| 1990 | 3 | JP4 | 14.4 | 9.4 | 10.8 | 12.1 | 13.7 | 27 |
| 1990 | 4 | JP4 | 28.1 | 3.9 | 10.5 | 10.9 | 15.0 | 33 |
| 1990 | 5 | JP4 | 53.3 | 6.6 | 10.8 | 11.6 | 13.7 | 28 |
| 1990 | 8 | JP4 | 11.2 | 6.6 | 13.4 | 14.0 | 19.7 | 8 |
| 1991 | 1 | JP4 | 46.4 | 8.0 | 11.3 | 11.4 | 13.4 | 36 |
| 1991 | 2 | JP4 | 200.0 | 5.0 | 9.7 | 9.6 | 15.5 | 166 |
| 1991 | 3 | JP4 | 803.8 | 6.3 | 11.9 | 12.5 | 18.3 | 409 |
| 1991 | 4 | JP4 | 55.0 | 5.5 | 10.7 | 11.1 | 18.0 | 93 |
| 1991 | 5 | JP4 | 190.4 | 5.6 | 11.6 | 12.5 | 15.4 | 96 |
| 1991 | 8 | JP4 | 59.5 | 7.1 | 11.9 | 12.1 | 22.6 | 43 |
| 1992 | 1 | JP4 | 21.2 | 9.2 | 10.9 | 10.9 | 12.1 | 17 |
| 1992 | 2 | JP4 | 134.9 | 4.5 | 9.4 | 9.0 | 13.8 | 107 |
| 1992 | 3 | JP4 | 502.2 | 6.0 | 12.3 | 12.3 | 22.7 | 354 |
| 1992 | 4 | JP4 | 29.4 | 6.2 | 11.1 | 10.1 | 15.3 | 78 |
| 1992 | 5 | JP4 | 165.7 | 5.2 | 12.6 | 13.3 | 16.9 | 100 |
| 1992 | 8 | JP4 | 5.3 | 10.1 | 11.9 | 11.5 | 13.6 | 4 |
| 1993 | 2 | JP4 | 149.7 | 7.5 | 11.1 | 11.1 | 13.9 | 84 |
| 1993 | 3 | JP4 | 351.5 | 5.2 | 12.6 | 12.3 | 19.3 | 404 |
| 1993 | 4 | JP4 | 90.2 | 3.5 | 11.4 | 10.1 | 16.8 | 194 |
| 1993 | 5 | JP4 | 80.3 | 8.9 | 12.2 | 12.4 | 15.3 | 85 |
| 1993 | 8 | JP4 | 9.4 | 13.0 | 15.8 | 15.8 | 18.0 | 6 |
| 1994 | 2 | JP4 | 72.0 | 9.0 | 11.7 | 10.9 | 14.8 | 52 |
| 1994 | 3 | JP4 | 27.2 | 8.0 | 11.9 | 12.3 | 14.8 | 18 |
| 1994 | 4 | JP4 | 103.9 | 3.0 | 11.4 | 11.1 | 18.0 | 204 |
| 1995 | 4 | JP4 | 61.9 | 8.6 | 12.7 | 12.8 | 20.1 | 134 |
| 1995 | 7 | JP4 | 4.9 | 13.6 | 13.6 | 13.6 | 13.6 | 1 |
| 1995 | 8 | JP4 | 0.1 | 8.6 | 9.6 | 10.1 | 10.3 | 3 |
| 1996 | 8 | JP4 | 0.7 | 12.5 | 12.7 | 12.8 | 12.9 | 2 |

*Table 5*

## *Values of JP5 for Aromatics by Region*

(Volume in Millions of Gallons)

(Spec = 25.0% max)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 3 | JP5 | 15.0 | 21.0 | 22.8 | 22.7 | 24.5 | 6 |
| 1990 | 5 | JP5 | 32.8 | 19.2 | 22.4 | 22.5 | 23.8 | 26 |
| 1991 | 2 | JP5 | 5.9 | 14.0 | 15.3 | 15.4 | 16.0 | 9 |
| 1991 | 3 | JP5 | 298.5 | 11.5 | 17.7 | 18.3 | 22.4 | 145 |
| 1991 | 5 | JP5 | 159.0 | 8.4 | 21.5 | 21.4 | 24.4 | 100 |
| 1992 | 2 | JP5 | 6.0 | 14.0 | 15.6 | 15.6 | 17.0 | 8 |
| 1992 | 3 | JP5 | 232.9 | 13.0 | 18.4 | 19.2 | 21.7 | 105 |
| 1992 | 5 | JP5 | 137.6 | 20.6 | 22.7 | 22.7 | 24.7 | 79 |
| 1993 | 3 | JP5 | 266.9 | 13.4 | 18.1 | 18.4 | 21.1 | 123 |
| 1993 | 5 | JP5 | 5.0 | 11.7 | 12.0 | 11.8 | 12.2 | 3 |
| 1993 | 7 | JP5 | 55.6 | 17.3 | 19.2 | 19.0 | 20.4 | 9 |
| 1994 | 3 | JP5 | 125.4 | 0.9 | 18.8 | 19.3 | 21.2 | 49 |
| 1994 | 7 | JP5 | 23.5 | 17.0 | 18.7 | 18.4 | 20.4 | 7 |
| 1995 | 3 | JP5 | 10.5 | 11.5 | 17.6 | 15.6 | 20.2 | 23 |
| 1995 | 7 | JP5 | 23.1 | 19.0 | 20.1 | 20.1 | 21.0 | 8 |
| 1996 | 3 | JP5 | 240.4 | 12.8 | 18.5 | 18.6 | 23.6 | 98 |
| 1996 | 5 | JP5 | 29.5 | 19.6 | 20.4 | 20.6 | 22.9 | 9 |
| 1996 | 7 | JP5 | 70.6 | 15.6 | 18.6 | 18.6 | 20.7 | 22 |
| 1996 | 8 | JP5 | 9.7 | 15.6 | 15.8 | 15.8 | 15.9 | 2 |

## *Table 6*

### *Values of JP8 for Aromatics by Region*

(Volume in Millions of Gallons)

(Spec = 25.0% max)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 5 | JP8 | 4.0 | 19.2 | 22.0 | 22.0 | 23.3 | 7 |
| 1991 | 5 | JP8 | 8.5 | 20.6 | 22.6 | 22.6 | 23.5 | 14 |
| 1991 | 8 | JP8 | 3.9 | 17.7 | 18.3 | 18.3 | 18.8 | 3 |
| 1992 | 5 | JP8 | 4.4 | 21.3 | 22.6 | 22.6 | 24.3 | 7 |
| 1992 | 8 | JP8 | 8.3 | 14.7 | 17.3 | 17.9 | 21.3 | 18 |
| 1993 | 3 | JP8 | 53.9 | 10.1 | 17.5 | 18.7 | 24.9 | 69 |
| 1993 | 5 | JP8 | 118.4 | 12.0 | 20.4 | 19.0 | 25.0 | 66 |
| 1993 | 7 | JP8 | 20.6 | 16.0 | 18.6 | 18.3 | 21.5 | 11 |
| 1993 | 8 | JP8 | 20.6 | 13.0 | 17.4 | 17.3 | 19.3 | 11 |
| 1994 | 2 | JP8 | 28.5 | 12.2 | 15.0 | 14.8 | 20.0 | 20 |
| 1994 | 3 | JP8 | 303.0 | 8.6 | 17.7 | 18.6 | 24.3 | 281 |
| 1994 | 5 | JP8 | 151.1 | 12.7 | 21.8 | 19.6 | 24.8 | 88 |
| 1994 | 7 | JP8 | 5.7 | 16.1 | 16.7 | 16.7 | 17.5 | 3 |
| 1994 | 8 | JP8 | 43.1 | 12.8 | 18.7 | 18.7 | 23.1 | 31 |
| 1995 | 1 | JP8 | 2.9 | 17.0 | 19.2 | 19.1 | 20.7 | 30 |
| 1995 | 2 | JP8 | 126.6 | 11.0 | 15.3 | 15.3 | 22.6 | 83 |
| 1995 | 3 | JP8 | 455.4 | 7.1 | 17.5 | 17.8 | 24.8 | 326 |
| 1995 | 4 | JP8 | 9.9 | 13.7 | 17.3 | 17.0 | 21.2 | 16 |
| 1995 | 5 | JP8 | 239.3 | 10.9 | 20.8 | 18.5 | 25.0 | 154 |
| 1995 | 7 | JP8 | 65.1 | 9.7 | 16.7 | 16.7 | 21.8 | 21 |
| 1995 | 8 | JP8 | 96.4 | 10.1 | 18.3 | 17.9 | 22.0 | 115 |
| 1996 | 1 | JP8 | 18.8 | 17.5 | 19.5 | 19.9 | 23.7 | 61 |
| 1996 | 2 | JP8 | 182.6 | 11.1 | 14.9 | 15.0 | 21.5 | 120 |
| 1996 | 3 | JP8 | 608.8 | 9.1 | 17.8 | 18.6 | 24.9 | 366 |
| 1996 | 4 | JP8 | 76.4 | 13.0 | 17.8 | 18.1 | 22.9 | 81 |
| 1996 | 5 | JP8 | 412.7 | 8.6 | 18.7 | 17.0 | 24.6 | 217 |
| 1996 | 6 | JP8 | 39.9 | 15.8 | 16.0 | 16.0 | 16.3 | 8 |
| 1996 | 7 | JP8 | 259.5 | 12.2 | 18.4 | 17.3 | 23.0 | 106 |
| 1996 | 8 | JP8 | 150.5 | 13.0 | 18.5 | 17.4 | 21.1 | 140 |

NATO/CEPS JA1 Min/Max: "7.1 - 24.0%". Mean of 18.2%.

*Table 7*

## *Values of JP4 for Olefins by Region*

(Volume in Millions of Gallons)

(Spec = 5.0% max, "S" Revision, No Requirement)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 2 | JP4 | 2.2 | 0.5 | 0.55 | 0.21 | 0.6 | 2 |
| 1990 | 3 | JP4 | 14.4 | 0.2 | 0.53 | 1.07 | 1.6 | 27 |
| 1990 | 4 | JP4 | 28.1 | 0.1 | 0.95 | 0.67 | 2.9 | 33 |
| 1990 | 5 | JP4 | 53.3 | 0.2 | 0.85 | 0.50 | 1.2 | 14 |
| 1990 | 8 | JP4 | 11.2 | 0.3 | 0.55 | 0.55 | 0.9 | 6 |
| 1991 | 1 | JP4 | 46.4 | 0.4 | 1.16 | 1.13 | 2.3 | 36 |
| 1991 | 2 | JP4 | 200.0 | 0.2 | 1.08 | 1.27 | 4.5 | 164 |
| 1991 | 3 | JP4 | 803.8 | 0.1 | 0.86 | 1.07 | 3.8 | 393 |
| 1991 | 4 | JP4 | 55.0 | 0.1 | 1.06 | 0.92 | 5.1 | 92 |
| 1991 | 5 | JP4 | 190.4 | 0.1 | 0.67 | 0.65 | 3.5 | 88 |
| 1991 | 8 | JP4 | 59.5 | 0.2 | 0.61 | 0.56 | 1.2 | 33 |
| 1992 | 1 | JP4 | 21.2 | 0.6 | 1.10 | 1.10 | 1.9 | 17 |
| 1992 | 2 | JP4 | 134.9 | 0.4 | 1.10 | 1.24 | 5.0 | 107 |
| 1992 | 3 | JP4 | 502.2 | 0.1 | 0.74 | 0.92 | 2.5 | 353 |
| 1992 | 4 | JP4 | 29.4 | 0.1 | 0.62 | 0.67 | 2.5 | 77 |
| 1992 | 5 | JP4 | 165.7 | 0.2 | 0.99 | 1.08 | 2.9 | 100 |
| 1992 | 8 | JP4 | 5.3 | 0.7 | 1.05 | 0.85 | 1.9 | 4 |
| 1993 | 2 | JP4 | 149.7 | 0.6 | 1.27 | 1.59 | 4.0 | 83 |
| 1993 | 3 | JP4 | 351.5 | 0.2 | 0.65 | 0.81 | 2.7 | 403 |
| 1993 | 4 | JP4 | 90.2 | 0.2 | 0.67 | 0.73 | 2.1 | 194 |
| 1993 | 5 | JP4 | 80.3 | 0.5 | 1.17 | 1.16 | 3.1 | 85 |
| 1993 | 8 | JP4 | 9.4 | 2.0 | 2.83 | 2.84 | 4.0 | 6 |
| 1994 | 2 | JP4 | 72.0 | 0.7 | 1.64 | 2.18 | 5.0 | 52 |
| 1994 | 3 | JP4 | 27.2 | 0.2 | 0.76 | 0.83 | 1.8 | 18 |
| 1994 | 4 | JP4 | 103.9 | 0.2 | 0.66 | 0.59 | 4.3 | 198 |
| 1995 | 4 | JP4 | 61.9 | 0.1 | 0.62 | 0.62 | 2.4 | 133 |
| 1995 | 7 | JP4 | 4.9 | 0.3 | 0.30 | 0.30 | 0.3 | 1 |
| 1995 | 8 | JP4 | 0.1 | 0.2 | 0.20 | 0.20 | 0.2 | 3 |
| 1996 | 8 | JP4 | 0.7 | 0.2 | 0.20 | 0.20 | 0.2 | 2 |

*Table 8*

## *Values of JP5 for Olefins by Region*

(Volume in Millions of Gallons)

(Spec = 5.0% max, "S" Revision, No Requirement)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 3 | JP5 | 15.0 | 0.4 | 0.48 | 0.48 | 0.5 | 6 |
| 1990 | 5 | JP5 | 32.8 | 0.5 | 0.77 | 0.76 | 1.0 | 26 |
| 1991 | 2 | JP5 | 5.9 | 1.0 | 1.00 | 1.00 | 1.0 | 9 |
| 1991 | 3 | JP5 | 298.5 | 0.1 | 0.80 | 0.74 | 3.9 | 145 |
| 1991 | 5 | JP5 | 159.0 | 0.8 | 1.16 | 1.13 | 2.5 | 99 |
| 1992 | 2 | JP5 | 6.0 | 1.0 | 1.38 | 1.34 | 4.0 | 8 |
| 1992 | 3 | JP5 | 232.9 | 0.3 | 0.84 | 0.87 | 2.8 | 105 |
| 1992 | 5 | JP5 | 137.6 | 0.7 | 1.36 | 1.36 | 4.8 | 79 |
| 1993 | 3 | JP5 | 266.9 | 0.1 | 0.85 | 0.87 | 3.6 | 123 |
| 1993 | 5 | JP5 | 5.0 | 1.1 | 1.43 | 1.29 | 1.9 | 3 |
| 1993 | 7 | JP5 | 55.6 | 0.3 | 0.78 | 0.82 | 1.2 | 9 |
| 1994 | 3 | JP5 | 125.4 | 0.5 | 0.92 | 0.98 | 1.6 | 49 |
| 1994 | 7 | JP5 | 23.5 | 0.3 | 0.66 | 0.63 | 0.9 | 7 |
| 1995 | 3 | JP5 | 10.5 | 0.7 | 1.02 | 1.16 | 1.7 | 23 |
| 1995 | 7 | JP5 | 23.1 | 0.5 | 0.79 | 0.71 | 1.2 | 8 |
| 1996 | 3 | JP5 | 240.4 | 0.1 | 0.90 | 0.88 | 2.0 | 98 |
| 1996 | 5 | JP5 | 29.5 | 0.9 | 1.18 | 1.13 | 1.4 | 9 |
| 1996 | 7 | JP5 | 70.6 | 0.2 | 0.96 | 0.92 | 2.0 | 22 |
| 1996 | 8 | JP5 | 9.7 | 0.7 | 0.75 | 0.75 | 0.8 | 2 |

## *Table 9*

### *Values of JP8 for Olefins by Region*

(Volume in Millions of Gallons)

(Spec = 5.0% max)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 5 | JP8 | 4.0 | 0.5 | 0.74 | 0.75 | 1.0 | 7 |
| 1991 | 5 | JP8 | 8.5 | 0.8 | 1.07 | 1.08 | 1.4 | 14 |
| 1991 | 8 | JP8 | 3.9 | 0.6 | 0.87 | 0.87 | 1.2 | 3 |
| 1992 | 5 | JP8 | 4.4 | 0.7 | 1.20 | 1.20 | 1.5 | 7 |
| 1992 | 8 | JP8 | 8.3 | 0.6 | 0.60 | 0.60 | 0.6 | 1 |
| 1993 | 3 | JP8 | 53.9 | 0.4 | 1.06 | 1.05 | 2.5 | 69 |
| 1993 | 5 | JP8 | 118.4 | 0.1 | 1.60 | 1.95 | 3.6 | 66 |
| 1993 | 7 | JP8 | 20.6 | 0.3 | 0.42 | 0.49 | 0.7 | 11 |
| 1993 | 8 | JP8 | 20.6 | 0.7 | 1.27 | 1.22 | 1.9 | 7 |
| 1994 | 2 | JP8 | 28.5 | 1.0 | 1.84 | 1.86 | 5.0 | 19 |
| 1994 | 3 | JP8 | 303.0 | 0.1 | 1.14 | 1.29 | 4.0 | 281 |
| 1994 | 5 | JP8 | 151.1 | 0.5 | 1.75 | 2.06 | 4.8 | 88 |
| 1994 | 7 | JP8 | 5.7 | 0.5 | 0.63 | 0.65 | 0.9 | 3 |
| 1994 | 8 | JP8 | 43.1 | 0.1 | 1.50 | 1.52 | 2.7 | 27 |
| 1995 | 1 | JP8 | 2.9 | 0.4 | 1.23 | 1.24 | 2.1 | 30 |
| 1995 | 2 | JP8 | 126.6 | 0.7 | 2.35 | 2.36 | 5.0 | 81 |
| 1995 | 3 | JP8 | 455.4 | 0.3 | 1.23 | 1.31 | 4.6 | 324 |
| 1995 | 4 | JP8 | 9.9 | 0.5 | 1.00 | 1.04 | 2.9 | 16 |
| 1995 | 5 | JP8 | 239.3 | 0.6 | 2.17 | 2.34 | 4.4 | 154 |
| 1995 | 7 | JP8 | 65.1 | 0.2 | 0.51 | 0.55 | 1.1 | 21 |
| 1995 | 8 | JP8 | 96.4 | 0.3 | 0.96 | 0.92 | 4.1 | 66 |
| 1996 | 1 | JP8 | 18.8 | 0.6 | 1.02 | 0.95 | 1.9 | 61 |
| 1996 | 2 | JP8 | 182.6 | 0.5 | 1.82 | 1.98 | 5.0 | 120 |
| 1996 | 3 | JP8 | 608.8 | 0.1 | 1.19 | 1.17 | 4.3 | 353 |
| 1996 | 4 | JP8 | 76.4 | 0.2 | 0.98 | 0.93 | 3.0 | 75 |
| 1996 | 5 | JP8 | 412.7 | 0.4 | 1.85 | 2.27 | 5.0 | 217 |
| 1996 | 6 | JP8 | 39.9 | 0.3 | 0.30 | 0.30 | 0.3 | 8 |
| 1996 | 7 | JP8 | 259.5 | 0.2 | 0.64 | 0.47 | 1.3 | 95 |
| 1996 | 8 | JP8 | 150.5 | 0.3 | 0.80 | 0.38 | 3.1 | 91 |

NATO/CEPS JA1 Min/Max: "0.1 - 4.7%". Mean of 0.8%.

*Table 10*

## *Values of JP4 for Total Sulfur by Region*

(Volume in Millions of Gallons)

(Spec = 0.40% max)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 2 | JP4 | 2.2 | 0.00 | 0.164 | 0.094 | 0.26 | 3 |
| 1990 | 3 | JP4 | 14.4 | 0.00 | 0.027 | 0.048 | 0.20 | 27 |
| 1990 | 4 | JP4 | 28.1 | 0.00 | 0.010 | 0.010 | 0.03 | 33 |
| 1990 | 5 | JP4 | 53.3 | 0.00 | 0.032 | 0.020 | 0.10 | 28 |
| 1990 | 8 | JP4 | 11.2 | 0.01 | 0.047 | 0.042 | 0.08 | 8 |
| 1991 | 1 | JP4 | 46.4 | 0.00 | 0.012 | 0.011 | 0.04 | 36 |
| 1991 | 2 | JP4 | 200.0 | 0.00 | 0.082 | 0.057 | 0.28 | 166 |
| 1991 | 3 | JP4 | 803.8 | 0.00 | 0.039 | 0.036 | 0.40 | 409 |
| 1991 | 4 | JP4 | 55.0 | 0.00 | 0.021 | 0.019 | 0.11 | 93 |
| 1991 | 5 | JP4 | 190.4 | 0.00 | 0.038 | 0.025 | 0.15 | 96 |
| 1991 | 8 | JP4 | 59.5 | 0.01 | 0.027 | 0.023 | 0.06 | 43 |
| 1992 | 1 | JP4 | 21.2 | 0.01 | 0.035 | 0.040 | 0.14 | 17 |
| 1992 | 2 | JP4 | 134.9 | 0.01 | 0.085 | 0.048 | 0.29 | 107 |
| 1992 | 3 | JP4 | 502.2 | 0.00 | 0.029 | 0.029 | 0.16 | 354 |
| 1992 | 4 | JP4 | 29.4 | 0.00 | 0.035 | 0.035 | 0.20 | 78 |
| 1992 | 5 | JP4 | 165.7 | 0.00 | 0.039 | 0.022 | 0.25 | 100 |
| 1992 | 8 | JP4 | 5.3 | 0.02 | 0.050 | 0.034 | 0.12 | 4 |
| 1993 | 2 | JP4 | 149.7 | 0.00 | 0.053 | 0.073 | 0.30 | 84 |
| 1993 | 3 | JP4 | 351.5 | 0.00 | 0.024 | 0.026 | 0.17 | 404 |
| 1993 | 4 | JP4 | 90.2 | 0.00 | 0.034 | 0.032 | 0.24 | 194 |
| 1993 | 5 | JP4 | 80.3 | 0.00 | 0.033 | 0.019 | 0.15 | 85 |
| 1993 | 8 | JP4 | 9.4 | 0.08 | 0.162 | 0.163 | 0.30 | 6 |
| 1994 | 2 | JP4 | 72.0 | 0.02 | 0.058 | 0.066 | 0.40 | 52 |
| 1994 | 3 | JP4 | 27.2 | 0.00 | 0.045 | 0.028 | 0.15 | 18 |
| 1994 | 4 | JP4 | 103.9 | 0.00 | 0.029 | 0.032 | 0.12 | 204 |
| 1995 | 4 | JP4 | 61.9 | 0.00 | 0.018 | 0.019 | 0.22 | 134 |
| 1995 | 7 | JP4 | 4.9 | 0.04 | 0.040 | 0.040 | 0.04 | 1 |
| 1995 | 8 | JP4 | 0.1 | 0.04 | 0.050 | 0.056 | 0.06 | 3 |
| 1996 | 8 | JP4 | 0.7 | 0.04 | 0.045 | 0.048 | 0.05 | 2 |

*Table 11*

## *Values of JP5 for Total Sulfur by Region*

(Volume in Millions of Gallons)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 3 | JP5 | 15.0 | 0.02 | 0.038 | 0.038 | 0.06 | 6 |
| 1990 | 5 | JP5 | 32.8 | 0.00 | 0.017 | 0.020 | 0.07 | 26 |
| 1991 | 2 | JP5 | 5.9 | 0.04 | 0.044 | 0.045 | 0.06 | 9 |
| 1991 | 3 | JP5 | 298.5 | 0.00 | 0.042 | 0.055 | 0.15 | 145 |
| 1991 | 5 | JP5 | 159.0 | 0.00 | 0.014 | 0.014 | 0.06 | 100 |
| 1992 | 2 | JP5 | 6.0 | 0.00 | 0.055 | 0.054 | 0.12 | 8 |
| 1992 | 3 | JP5 | 232.9 | 0.01 | 0.062 | 0.081 | 0.14 | 105 |
| 1992 | 5 | JP5 | 137.6 | 0.00 | 0.013 | 0.015 | 0.05 | 79 |
| 1993 | 3 | JP5 | 266.9 | 0.00 | 0.065 | 0.081 | 0.13 | 123 |
| 1993 | 5 | JP5 | 5.0 | 0.00 | 0.007 | 0.010 | 0.01 | 3 |
| 1993 | 7 | JP5 | 55.6 | 0.01 | 0.013 | 0.012 | 0.03 | 9 |
| 1994 | 3 | JP5 | 125.4 | 0.00 | 0.079 | 0.089 | 0.13 | 49 |
| 1994 | 7 | JP5 | 23.5 | 0.01 | 0.011 | 0.012 | 0.02 | 7 |
| 1995 | 3 | JP5 | 10.5 | 0.00 | 0.056 | 0.014 | 0.11 | 23 |
| 1995 | 7 | JP5 | 23.1 | 0.01 | 0.014 | 0.012 | 0.02 | 8 |
| 1996 | 3 | JP5 | 240.4 | 0.00 | 0.081 | 0.080 | 0.14 | 98 |
| 1996 | 5 | JP5 | 29.5 | 0.01 | 0.010 | 0.010 | 0.01 | 9 |
| 1996 | 7 | JP5 | 70.6 | 0.01 | 0.035 | 0.030 | 0.14 | 22 |
| 1996 | 8 | JP5 | 9.7 | 0.03 | 0.030 | 0.030 | 0.03 | 2 |

*Table 12*

## *Values of JP8 for Total Sulfur by Region*

(Volume in Millions of Gallons)

(Spec = 0.30% max)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 5 | JP8 | 4.0 | 0.00 | 0.021 | 0.023 | 0.07 | 7 |
| 1991 | 5 | JP8 | 8.5 | 0.00 | 0.015 | 0.015 | 0.03 | 14 |
| 1991 | 8 | JP8 | 3.9 | 0.01 | 0.010 | 0.010 | 0.01 | 3 |
| 1992 | 5 | JP8 | 4.4 | 0.00 | 0.014 | 0.014 | 0.03 | 7 |
| 1992 | 8 | JP8 | 8.3 | 0.07 | 0.087 | 0.085 | 0.10 | 18 |
| 1993 | 3 | JP8 | 53.9 | 0.00 | 0.040 | 0.055 | 0.16 | 69 |
| 1993 | 5 | JP8 | 118.4 | 0.00 | 0.018 | 0.013 | 0.04 | 65 |
| 1993 | 7 | JP8 | 20.6 | 0.01 | 0.021 | 0.025 | 0.07 | 11 |
| 1993 | 8 | JP8 | 20.6 | 0.01 | 0.053 | 0.035 | 0.09 | 11 |
| 1994 | 2 | JP8 | 28.5 | 0.01 | 0.065 | 0.067 | 0.13 | 20 |
| 1994 | 3 | JP8 | 303.0 | 0.00 | 0.042 | 0.060 | 0.20 | 281 |
| 1994 | 5 | JP8 | 151.1 | 0.00 | 0.018 | 0.015 | 0.05 | 88 |
| 1994 | 7 | JP8 | 5.7 | 0.01 | 0.037 | 0.039 | 0.05 | 3 |
| 1994 | 8 | JP8 | 43.1 | 0.01 | 0.033 | 0.023 | 0.09 | 31 |
| 1995 | 1 | JP8 | 2.9 | 0.00 | 0.014 | 0.014 | 0.03 | 30 |
| 1995 | 2 | JP8 | 126.6 | 0.03 | 0.092 | 0.087 | 0.26 | 83 |
| 1995 | 3 | JP8 | 455.4 | 0.00 | 0.053 | 0.059 | 0.30 | 326 |
| 1995 | 4 | JP8 | 9.9 | 0.01 | 0.030 | 0.030 | 0.06 | 16 |
| 1995 | 5 | JP8 | 239.3 | 0.00 | 0.037 | 0.027 | 0.13 | 154 |
| 1995 | 7 | JP8 | 65.1 | 0.01 | 0.054 | 0.051 | 0.30 | 21 |
| 1995 | 8 | JP8 | 96.4 | 0.01 | 0.072 | 0.053 | 0.11 | 115 |
| 1996 | 1 | JP8 | 18.8 | 0.01 | 0.023 | 0.037 | 0.09 | 62 |
| 1996 | 2 | JP8 | 182.6 | 0.03 | 0.085 | 0.089 | 0.26 | 120 |
| 1996 | 3 | JP8 | 608.8 | 0.00 | 0.042 | 0.035 | 0.30 | 366 |
| 1996 | 4 | JP8 | 76.4 | 0.00 | 0.026 | 0.023 | 0.10 | 81 |
| 1996 | 5 | JP8 | 412.7 | 0.00 | 0.048 | 0.035 | 0.30 | 217 |
| 1996 | 6 | JP8 | 39.9 | 0.01 | 0.010 | 0.010 | 0.01 | 8 |
| 1996 | 7 | JP8 | 259.5 | 0.00 | 0.079 | 0.101 | 0.28 | 106 |
| 1996 | 8 | JP8 | 150.5 | 0.00 | 0.067 | 0.053 | 0.11 | 140 |

NATO/CEPS JA1 Min/Max: "0.00 - 0.25%". Mean of 0.06%.

*Table 13*

## *Values of JP4 for Mercaptan Sulfur by Region*

(Volume in Millions of Gallons)

(Spec = 0.002% max)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 3 | JP4 | 14.4 | 0.0001 | 0.0003 | 0.0009 | 0.0019 | 26 |
| 1990 | 4 | JP4 | 28.1 | 0.0010 | 0.0015 | 0.0006 | 0.0020 | 12 |
| 1990 | 5 | JP4 | 53.3 | 0.0002 | 0.0005 | 0.0003 | 0.0011 | 18 |
| 1990 | 8 | JP4 | 11.2 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 1 |
| 1991 | 1 | JP4 | 46.4 | 0.0010 | 0.0011 | 0.0011 | 0.0020 | 36 |
| 1991 | 2 | JP4 | 200.0 | 0.0001 | 0.0009 | 0.0006 | 0.0017 | 97 |
| 1991 | 3 | JP4 | 803.8 | 0.0001 | 0.0007 | 0.0006 | 0.0020 | 344 |
| 1991 | 4 | JP4 | 55.0 | 0.0002 | 0.0017 | 0.0010 | 0.0020 | 59 |
| 1991 | 5 | JP4 | 190.4 | 0.0001 | 0.0007 | 0.0005 | 0.0020 | 64 |
| 1991 | 8 | JP4 | 59.5 | 0.0002 | 0.0003 | 0.0002 | 0.0003 | 3 |
| 1992 | 1 | JP4 | 21.2 | 0.0010 | 0.0011 | 0.0011 | 0.0020 | 17 |
| 1992 | 2 | JP4 | 134.9 | 0.0001 | 0.0009 | 0.0006 | 0.0019 | 53 |
| 1992 | 3 | JP4 | 502.2 | 0.0001 | 0.0005 | 0.0005 | 0.0020 | 230 |
| 1992 | 4 | JP4 | 29.4 | 0.0003 | 0.0017 | 0.0009 | 0.0020 | 56 |
| 1992 | 5 | JP4 | 165.7 | 0.0001 | 0.0006 | 0.0003 | 0.0018 | 71 |
| 1992 | 8 | JP4 | 5.3 | 0.0006 | 0.0006 | 0.0006 | 0.0006 | 1 |
| 1993 | 2 | JP4 | 149.7 | 0.0008 | 0.0010 | 0.0002 | 0.0013 | 9 |
| 1993 | 3 | JP4 | 351.5 | 0.0001 | 0.0004 | 0.0004 | 0.0020 | 231 |
| 1993 | 4 | JP4 | 90.2 | 0.0002 | 0.0016 | 0.0007 | 0.0020 | 122 |
| 1993 | 5 | JP4 | 80.3 | 0.0001 | 0.0004 | 0.0003 | 0.0013 | 85 |
| 1993 | 8 | JP4 | 9.4 | 0.0011 | 0.0014 | 0.0014 | 0.0019 | 6 |
| 1994 | 2 | JP4 | 72.0 | 0.0005 | 0.0009 | 0.0004 | 0.0015 | 15 |
| 1994 | 3 | JP4 | 27.2 | 0.0001 | 0.0009 | 0.0008 | 0.0016 | 14 |
| 1994 | 4 | JP4 | 103.9 | 0.0002 | 0.0018 | 0.0006 | 0.0020 | 94 |
| 1995 | 4 | JP4 | 61.9 | 0.0004 | 0.0015 | 0.0008 | 0.0020 | 86 |
| 1995 | 7 | JP4 | 4.9 | 0.0013 | 0.0013 | 0.0013 | 0.0013 | 1 |

*Table 14*

## *Values of JP5 for Mercaptan Sulfur by Region*

(Volume in Millions of Gallons)

(Spec = 0.002% max)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 3 | JP5 | 15.0 | 0.0002 | 0.0007 | 0.0006 | 0.0010 | 6 |
| 1991 | 2 | JP5 | 5.9 | 0.0012 | 0.0015 | 0.0015 | 0.0017 | 9 |
| 1991 | 3 | JP5 | 298.5 | 0.0001 | 0.0007 | 0.0006 | 0.0016 | 144 |
| 1991 | 5 | JP5 | 159.0 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 8 |
| 1992 | 2 | JP5 | 6.0 | 0.0012 | 0.0016 | 0.0002 | 0.0020 | 8 |
| 1992 | 3 | JP5 | 232.9 | 0.0001 | 0.0008 | 0.0008 | 0.0016 | 105 |
| 1992 | 5 | JP5 | 137.6 | 0.0001 | 0.0002 | 0.0004 | 0.0009 | 20 |
| 1993 | 3 | JP5 | 266.9 | 0.0001 | 0.0008 | 0.0009 | 0.0019 | 123 |
| 1993 | 5 | JP5 | 5.0 | 0.0004 | 0.0004 | 0.0004 | 0.0004 | 1 |
| 1994 | 3 | JP5 | 125.4 | 0.0001 | 0.0009 | 0.0010 | 0.0019 | 49 |
| 1995 | 3 | JP5 | 10.5 | 0.0001 | 0.0007 | 0.0003 | 0.0015 | 23 |
| 1995 | 7 | JP5 | 23.1 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 1 |
| 1996 | 3 | JP5 | 240.4 | 0.0001 | 0.0010 | 0.0010 | 0.0020 | 98 |
| 1996 | 5 | JP5 | 29.5 | 0.0007 | 0.0012 | 0.0006 | 0.0017 | 2 |
| 1996 | 7 | JP5 | 70.6 | 0.0001 | 0.0006 | 0.0004 | 0.0018 | 15 |
| 1996 | 8 | JP5 | 9.7 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 2 |

*Table 15*

## *Values of JP8 for Mercaptan Sulfur by Region*

(Volume in Millions of Gallons)

(Spec = 0.002% max)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1991 | 8 | JP8 | 3.9 | 0.0003 | 0.0004 | 0.0004 | 0.0004 | 3 |
| 1992 | 8 | JP8 | 8.3 | 0.0004 | 0.0004 | 0.0005 | 0.0007 | 18 |
| 1993 | 3 | JP8 | 53.9 | 0.0001 | 0.0007 | 0.0006 | 0.0020 | 52 |
| 1993 | 5 | JP8 | 118.4 | 0.0001 | 0.0004 | 0.0004 | 0.0020 | 66 |
| 1993 | 7 | JP8 | 20.6 | 0.0001 | 0.0002 | 0.0003 | 0.0006 | 11 |
| 1993 | 8 | JP8 | 20.6 | 0.0004 | 0.0004 | 0.0004 | 0.0004 | 4 |
| 1994 | 2 | JP8 | 28.5 | 0.0001 | 0.0014 | 0.0006 | 0.0020 | 11 |
| 1994 | 3 | JP8 | 303.0 | 0.0001 | 0.0007 | 0.0008 | 0.0020 | 225 |
| 1994 | 5 | JP8 | 151.1 | 0.0001 | 0.0003 | 0.0005 | 0.0010 | 88 |
| 1994 | 7 | JP8 | 5.7 | 0.0001 | 0.0003 | 0.0003 | 0.0004 | 3 |
| 1994 | 8 | JP8 | 43.1 | 0.0003 | 0.0006 | 0.0001 | 0.0020 | 8 |
| 1995 | 1 | JP8 | 2.9 | 0.0001 | 0.0001 | 0.0002 | 0.0003 | 13 |
| 1995 | 2 | JP8 | 126.6 | 0.0007 | 0.0014 | 0.0006 | 0.0020 | 42 |
| 1995 | 3 | JP8 | 455.4 | 0.0001 | 0.0010 | 0.0008 | 0.0020 | 250 |
| 1995 | 4 | JP8 | 9.9 | 0.0010 | 0.0015 | 0.0067 | 0.0020 | 7 |
| 1995 | 5 | JP8 | 239.3 | 0.0001 | 0.0005 | 0.0007 | 0.0019 | 151 |
| 1995 | 7 | JP8 | 65.1 | 0.0001 | 0.0009 | 0.0010 | 0.0025 | 20 |
| 1995 | 8 | JP8 | 96.4 | 0.0003 | 0.0006 | 0.0003 | 0.0008 | 89 |
| 1996 | 1 | JP8 | 18.8 | 0.0003 | 0.0009 | 0.0006 | 0.0018 | 11 |
| 1996 | 2 | JP8 | 182.6 | 0.0001 | 0.0012 | 0.0009 | 0.0020 | 89 |
| 1996 | 3 | JP8 | 609.0 | 0.0001 | 0.0010 | 0.0004 | 0.0020 | 230 |
| 1996 | 4 | JP8 | 76.4 | 0.0010 | 0.0018 | 0.0010 | 0.0020 | 55 |
| 1996 | 5 | JP8 | 412.7 | 0.0001 | 0.0005 | 0.0006 | 0.0020 | 169 |
| 1996 | 6 | JP8 | 39.9 | 0.0003 | 0.0003 | 0.0004 | 0.0004 | 8 |
| 1996 | 7 | JP8 | 259.5 | 0.0001 | 0.0013 | 0.0012 | 0.0029 | 94 |
| 1996 | 8 | JP8 | 150.5 | 0.0001 | 0.0005 | 0.0002 | 0.0020 | 116 |

NATO/CEPS JA1 Min/Max: "0.0001 - 0.0030%". Mean of 0.0008%.

*Table 16*

## *Values of JP4 for Particulate Contamination by Region*

(Volume in Millions of Gallons)

(Spec = 1.0 mg/L max)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 2 | JP4 | 2.2 | 0.2 | 0.70 | 0.83 | 1.0 | 3 |
| 1990 | 3 | JP4 | 14.4 | 0.1 | 0.25 | 0.40 | 0.6 | 27 |
| 1990 | 4 | JP4 | 28.1 | 0.1 | 0.30 | 0.27 | 1.0 | 33 |
| 1990 | 5 | JP4 | 53.3 | 0.1 | 0.30 | 0.22 | 0.8 | 25 |
| 1990 | 8 | JP4 | 11.2 | 0.1 | 0.37 | 0.44 | 0.8 | 8 |
| 1991 | 1 | JP4 | 46.4 | 0.1 | 0.33 | 0.33 | 0.9 | 34 |
| 1991 | 2 | JP4 | 200.0 | 0.03 | 0.28 | 0.28 | 0.8 | 166 |
| 1991 | 3 | JP4 | 803.8 | 0.0 | 0.37 | 0.39 | 1.0 | 409 |
| 1991 | 4 | JP4 | 55.0 | 0.1 | 0.32 | 0.26 | 0.9 | 89 |
| 1991 | 5 | JP4 | 190.4 | 0.0 | 0.24 | 0.24 | 0.8 | 86 |
| 1991 | 8 | JP4 | 59.5 | 0.08 | 0.43 | 0.48 | 0.9 | 43 |
| 1992 | 1 | JP4 | 21.3 | 0.1 | 0.34 | 0.37 | 0.7 | 17 |
| 1992 | 2 | JP4 | 134.9 | 0.05 | 0.30 | 0.30 | 0.9 | 106 |
| 1992 | 3 | JP4 | 502.2 | 0.03 | 0.36 | 0.41 | 1.0 | 353 |
| 1992 | 4 | JP4 | 29.4 | 0.08 | 0.29 | 0.29 | 1.0 | 76 |
| 1992 | 5 | JP4 | 165.7 | 0.1 | 0.30 | 0.31 | 1.0 | 91 |
| 1992 | 8 | JP4 | 5.3 | 0.2 | 0.60 | 0.68 | 0.9 | 4 |
| 1993 | 2 | JP4 | 149.7 | 0.1 | 0.27 | 0.26 | 0.7 | 82 |
| 1993 | 3 | JP4 | 351.5 | 0.03 | 0.45 | 0.49 | 1.0 | 404 |
| 1993 | 4 | JP4 | 90.2 | 0.03 | 0.36 | 0.32 | 0.9 | 182 |
| 1993 | 5 | JP4 | 80.3 | 0.1 | 0.23 | 0.23 | 1.0 | 84 |
| 1993 | 8 | JP4 | 9.4 | 0.4 | 0.55 | 0.57 | 0.7 | 6 |
| 1994 | 2 | JP4 | 72.0 | 0.1 | 0.39 | 0.37 | 1.0 | 52 |
| 1994 | 3 | JP4 | 27.2 | 0.1 | 0.52 | 0.53 | 1.0 | 18 |
| 1994 | 4 | JP4 | 103.9 | 0.05 | 0.29 | 0.31 | 1.0 | 202 |
| 1995 | 4 | JP4 | 61.9 | 0.03 | 0.34 | 0.37 | 1.0 | 133 |
| 1995 | 7 | JP4 | 4.9 | 0.9 | 0.90 | 0.90 | 0.9 | 1 |
| 1995 | 8 | JP4 | 0.1 | 0.4 | 0.68 | 0.49 | 0.9 | 3 |
| 1996 | 8 | JP4 | 0.7 | 0.4 | 0.60 | 0.69 | 0.8 | 2 |

*Table 17*

## *Values of JP5 for Particulate Contamination by Region*

(Volume in Millions of Gallons)

(Spec = 1.0 mg/L max)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 3 | JP5 | 15.0 | 0.3 | 0.45 | 0.45 | 0.7 | 6 |
| 1990 | 5 | JP5 | 32.8 | 0.1 | 0.31 | 0.25 | 1.0 | 21 |
| 1991 | 2 | JP5 | 5.9 | 0.1 | 0.65 | 0.61 | 1.0 | 9 |
| 1991 | 3 | JP5 | 298.5 | 0.05 | 0.43 | 0.36 | 1.0 | 145 |
| 1991 | 5 | JP5 | 159.0 | 0.03 | 0.15 | 0.11 | 0.3 | 76 |
| 1992 | 2 | JP5 | 6.0 | 0.4 | 0.70 | 0.69 | 1.0 | 8 |
| 1992 | 3 | JP5 | 232.9 | 0.02 | 0.39 | 0.33 | 1.0 | 105 |
| 1992 | 5 | JP5 | 137.6 | 0.1 | 0.21 | 0.18 | 0.8 | 67 |
| 1993 | 3 | JP5 | 266.9 | 0.03 | 0.37 | 0.30 | 1.0 | 123 |
| 1993 | 5 | JP5 | 5.0 | 0.05 | 0.13 | 0.09 | 0.2 | 3 |
| 1993 | 7 | JP5 | 55.6 | 0.25 | 0.63 | 0.63 | 0.8 | 9 |
| 1994 | 3 | JP5 | 125.4 | 0.03 | 0.25 | 0.21 | 0.8 | 49 |
| 1994 | 7 | JP5 | 23.5 | 0.3 | 0.53 | 0.53 | 0.9 | 7 |
| 1995 | 3 | JP5 | 10.5 | 0.03 | 0.22 | 0.16 | 1.0 | 23 |
| 1995 | 7 | JP5 | 23.1 | 0.02 | 0.33 | 0.35 | 0.6 | 8 |
| 1996 | 3 | JP5 | 240.4 | 0.03 | 0.15 | 0.15 | 0.8 | 97 |
| 1996 | 5 | JP5 | 29.5 | 0.04 | 0.18 | 0.13 | 0.3 | 8 |
| 1996 | 7 | JP5 | 70.6 | 0.2 | 0.49 | 0.47 | 1.0 | 22 |
| 1996 | 8 | JP5 | 9.7 | 0.5 | 0.50 | 0.50 | 0.5 | 2 |

*Table 18*

## *Values of JP8 for Particulate Contamination by Region*

(Volume in Millions of Gallons)

(Spec = 1.0 mg/L max)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 5 | JP8 | 4.0 | 0.1 | 0.35 | 0.30 | 0.8 | 6 |
| 1991 | 5 | JP8 | 8.5 | 0.1 | 0.27 | 0.17 | 0.6 | 9 |
| 1991 | 8 | JP8 | 3.9 | 0.6 | 0.79 | 0.79 | 0.9 | 3 |
| 1992 | 5 | JP8 | 4.4 | 0.1 | 0.16 | 0.16 | 0.3 | 7 |
| 1992 | 8 | JP8 | 8.3 | 0.03 | 0.36 | 0.46 | 1.1 | 18 |
| 1993 | 3 | JP8 | 53.9 | 0.1 | 0.41 | 0.32 | 1.0 | 69 |
| 1993 | 5 | JP8 | 118.4 | 0.1 | 0.26 | 0.31 | 0.9 | 66 |
| 1993 | 7 | JP8 | 20.6 | 0.1 | 0.41 | 0.58 | 1.0 | 11 |
| 1993 | 8 | JP8 | 20.6 | 0.3 | 0.42 | 0.35 | 0.8 | 10 |
| 1994 | 2 | JP8 | 28.5 | 0.1 | 0.49 | 0.46 | 1.0 | 20 |
| 1994 | 3 | JP8 | 303.0 | 0.1 | 0.42 | 0.39 | 1.0 | 279 |
| 1994 | 5 | JP8 | 151.1 | 0.1 | 0.21 | 0.32 | 1.0 | 88 |
| 1994 | 7 | JP8 | 5.7 | 0.1 | 0.23 | 0.22 | 0.4 | 3 |
| 1994 | 8 | JP8 | 43.1 | 0.1 | 0.30 | 0.32 | 0.9 | 31 |
| 1995 | 1 | JP8 | 2.9 | 0.1 | 0.32 | 0.29 | 0.7 | 30 |
| 1995 | 2 | JP8 | 126.6 | 0.1 | 0.44 | 0.47 | 1.0 | 83 |
| 1995 | 3 | JP8 | 455.4 | 0.03 | 0.34 | 0.31 | 1.0 | 322 |
| 1995 | 4 | JP8 | 9.9 | 0.05 | 0.42 | 0.48 | 1.0 | 16 |
| 1995 | 5 | JP8 | 239.3 | 0.1 | 0.20 | 0.27 | 1.0 | 154 |
| 1995 | 7 | JP8 | 65.1 | 0.1 | 0.49 | 0.47 | 0.8 | 21 |
| 1995 | 8 | JP8 | 96.4 | 0.05 | 0.35 | 0.36 | 1.0 | 113 |
| 1996 | 1 | JP8 | 18.8 | 0.05 | 0.21 | 0.28 | 1.0 | 59 |
| 1996 | 2 | JP8 | 182.6 | 0.05 | 0.44 | 0.43 | 1.0 | 119 |
| 1996 | 3 | JP8 | 608.8 | 0.01 | 0.31 | 0.25 | 1.0 | 361 |
| 1996 | 4 | JP8 | 76.4 | 0.1 | 0.34 | 0.39 | 0.8 | 81 |
| 1996 | 5 | JP8 | 412.7 | 0.01 | 0.27 | 0.31 | 1.0 | 216 |
| 1996 | 6 | JP8 | 39.9 | 0.5 | 0.56 | 0.56 | 0.6 | 8 |
| 1996 | 7 | JP8 | 259.5 | 0.03 | 0.33 | 0.36 | 1.0 | 94 |
| 1996 | 8 | JP8 | 150.51 | 0.05 | 0.38 | 0.55 | 1.0 | 140 |

NATO/CEPS JA1 Min/Max: No Specification Requirement - Value Not Reported

*Table 19*

## *Values of JP4 for Filtration Time by Region*

(Volume in Millions of Gallons)

(Spec = 10 minutes max)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 2 | JP4 | 2.2 | 2 | 3.3 | 2.8 | 4 | 3 |
| 1990 | 3 | JP4 | 14.4 | 3 | 4.9 | 7.1 | 10 | 27 |
| 1990 | 4 | JP4 | 28.1 | 4 | 5.1 | 5.0 | 9 | 33 |
| 1990 | 5 | JP4 | 53.3 | 2 | 3.4 | 3.0 | 6 | 28 |
| 1990 | 8 | JP4 | 11.2 | 2 | 3.1 | 3.0 | 4 | 8 |
| 1991 | 1 | JP4 | 46.4 | 3 | 5.4 | 5.5 | 10 | 36 |
| 1991 | 2 | JP4 | 200.0 | 2 | 4.4 | 4.4 | 9 | 166 |
| 1991 | 3 | JP4 | 803.8 | 2 | 4.0 | 4.0 | 9 | 409 |
| 1991 | 4 | JP4 | 55.0 | 2 | 5.3 | 4.9 | 10 | 93 |
| 1991 | 5 | JP4 | 190.4 | 2 | 3.5 | 3.3 | 9 | 96 |
| 1991 | 8 | JP4 | 59.5 | 2 | 3.6 | 3.3 | 7 | 43 |
| 1992 | 1 | JP4 | 21.2 | 2 | 4.6 | 4.5 | 6 | 17 |
| 1992 | 2 | JP4 | 134.9 | 2 | 4.2 | 4.0 | 8 | 107 |
| 1992 | 3 | JP4 | 502.2 | 2 | 3.9 | 3.9 | 10 | 354 |
| 1992 | 4 | JP4 | 29.4 | 3 | 4.7 | 4.8 | 8 | 78 |
| 1992 | 5 | JP4 | 165.7 | 2 | 3.5 | 3.3 | 8 | 100 |
| 1992 | 8 | JP4 | 5.3 | 3 | 3.5 | 3.4 | 4 | 4 |
| 1993 | 2 | JP4 | 149.7 | 2 | 3.3 | 3.3 | 5 | 84 |
| 1993 | 3 | JP4 | 351.5 | 2 | 4.3 | 4.7 | 13 | 404 |
| 1993 | 4 | JP4 | 90.2 | 3 | 4.7 | 4.8 | 9 | 194 |
| 1993 | 5 | JP4 | 80.3 | 2 | 3.9 | 3.8 | 7 | 85 |
| 1993 | 8 | JP4 | 9.4 | 4 | 5.5 | 5.5 | 7 | 6 |
| 1994 | 2 | JP4 | 72.0 | 2 | 3.5 | 3.3 | 8 | 52 |
| 1994 | 3 | JP4 | 27.2 | 2 | 3.8 | 3.6 | 5 | 18 |
| 1994 | 4 | JP4 | 103.9 | 2 | 4.5 | 4.5 | 8 | 204 |
| 1995 | 4 | JP4 | 61.9 | 2 | 4.5 | 4.4 | 9 | 134 |
| 1995 | 7 | JP4 | 4.9 | 4 | 4.0 | 4.0 | 4 | 1 |
| 1995 | 8 | JP4 | 0.1 | 5 | 5.6 | 5.4 | 6 | 3 |
| 1996 | 8 | JP4 | 0.7 | 5 | 6.0 | 6.5 | 7 | 2 |

*Table 20*

## *Values of JP5 for Filtration Time by Region*

(Volume in Millions of Gallons)

(Spec = 15 minutes max)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 3 | JP5 | 15.0 | 9 | 9.7 | 9.6 | 10 | 6 |
| 1990 | 5 | JP5 | 32.8 | 2 | 3.5 | 3.5 | 4 | 26 |
| 1991 | 2 | JP5 | 5.9 | 3 | 3.7 | 3.8 | 4 | 9 |
| 1991 | 3 | JP5 | 298.5 | 2 | 4.3 | 3.6 | 12 | 145 |
| 1991 | 5 | JP5 | 159.0 | 3 | 3.6 | 3.7 | 6 | 100 |
| 1992 | 2 | JP5 | 6.0 | 3 | 4.0 | 4.0 | 5 | 8 |
| 1992 | 3 | JP5 | 232.9 | 2 | 4.2 | 3.9 | 9 | 104 |
| 1992 | 5 | JP5 | 137.6 | 3 | 3.7 | 3.6 | 13 | 79 |
| 1993 | 3 | JP5 | 266.9 | 2 | 3.7 | 3.2 | 13 | 123 |
| 1993 | 5 | JP5 | 5.0 | 3 | 3.0 | 3.0 | 3 | 3 |
| 1993 | 7 | JP5 | 55.6 | 2 | 4.8 | 4.7 | 7 | 9 |
| 1994 | 3 | JP5 | 125.4 | 2 | 3.3 | 3.0 | 8 | 49 |
| 1994 | 7 | JP5 | 23.5 | 3 | 4.7 | 5.0 | 8 | 7 |
| 1995 | 3 | JP5 | 10.5 | 2 | 3.0 | 3.2 | 7 | 243 |
| 1995 | 7 | JP5 | 23.1 | 4 | 4.6 | 4.3 | 6 | 8 |
| 1996 | 3 | JP5 | 240.4 | 2 | 3.1 | 3.1 | 6 | 98 |
| 1996 | 5 | JP5 | 29.5 | 3 | 3.7 | 3.4 | 4 | 9 |
| 1996 | 7 | JP5 | 70.6 | 4 | 5.5 | 5.5 | 9 | 22 |
| 1996 | 8 | JP5 | 9.7 | 3 | 3.5 | 3.5 | 4 | 2 |

*Table 21*

## *Values of JP8 for Filtration Time by Region*

(Volume in Millions of Gallons)

(Spec = 15 minutes max)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 5 | JP8 | 4.0 | 3 | 3.9 | 3.9 | 4 | 7 |
| 1991 | 5 | JP8 | 8.5 | 3 | 5.5 | 5.0 | 8 | 13 |
| 1991 | 8 | JP8 | 3.9 | 8 | 9.3 | 9.3 | 10 | 3 |
| 1992 | 5 | JP8 | 4.4 | 5 | 6.6 | 6.6 | 8 | 7 |
| 1992 | 8 | JP8 | 8.3 | 6 | 7.5 | 7.4 | 9 | 18 |
| 1993 | 3 | JP8 | 53.9 | 4 | 7.1 | 6.2 | 12 | 69 |
| 1993 | 5 | JP8 | 118.4 | 3 | 6.7 | 6.6 | 11 | 66 |
| 1993 | 7 | JP8 | 20.6 | 5 | 7.5 | 8.7 | 12 | 11 |
| 1993 | 8 | JP8 | 20.6 | 6 | 7.2 | 6.4 | 8 | 10 |
| 1994 | 2 | JP8 | 28.5 | 5 | 7.0 | 7.0 | 10 | 20 |
| 1994 | 3 | JP8 | 303.0 | 3 | 6.9 | 6.1 | 14 | 279 |
| 1994 | 5 | JP8 | 151.1 | 3 | 6.1 | 6.2 | 12 | 88 |
| 1994 | 7 | JP8 | 5.7 | 6 | 6.7 | 6.7 | 7 | 3 |
| 1994 | 8 | JP8 | 43.1 | 5 | 7.0 | 6.8 | 12 | 31 |
| 1995 | 1 | JP8 | 2.9 | 6 | 7.1 | 7.0 | 10 | 30 |
| 1995 | 2 | JP8 | 126.6 | 3 | 7.3 | 7.0 | 13 | 83 |
| 1995 | 3 | JP8 | 455.4 | 3 | 6.5 | 6.0 | 15 | 320 |
| 1995 | 4 | JP8 | 9.9 | 6 | 8.1 | 8.0 | 10 | 16 |
| 1995 | 5 | JP8 | 239.3 | 4 | 5.6 | 5.8 | 12 | 154 |
| 1995 | 7 | JP8 | 65.1 | 4 | 7.0 | 7.4 | 13 | 21 |
| 1995 | 8 | JP8 | 96.4 | 4 | 6.7 | 6.3 | 11 | 115 |
| 1996 | 1 | JP8 | 18.8 | 3 | 7.1 | 4.3 | 12 | 61 |
| 1996 | 2 | JP8 | 182.6 | 3 | 7.9 | 7.8 | 13 | 119 |
| 1996 | 3 | JP8 | 608.8 | 3 | 6.4 | 6.3 | 13 | 360 |
| 1996 | 4 | JP8 | 76.4 | 4 | 7.2 | 7.0 | 11 | 81 |
| 1996 | 5 | JP8 | 412.7 | 3 | 6.3 | 7.0 | 14 | 217 |
| 1996 | 6 | JP8 | 39.9 | 8 | 8.3 | 8.3 | 9 | 8 |
| 1996 | 7 | JP8 | 259.5 | 3 | 6.4 | 6.2 | 14 | 95 |
| 1996 | 8 | JP8 | 147.0 | 4 | 7.2 | 7.2 | 14 | 140 |

NATO/CEPS JA1 Min/Max: No Specification Requirement - Value Not Reported

*Table 22*

## *Values of JP4 for Total Acid Number by Region*

(Volume in Millions of Gallons)

(Spec = 0.015mg KOH/g max)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 2 | JP4 | 2.2 | 0.003 | 0.0037 | 0.0034 | 0.005 | 3 |
| 1990 | 3 | JP4 | 14.4 | 0.002 | 0.0050 | 0.0035 | 0.009 | 27 |
| 1990 | 4 | JP4 | 28.1 | 0.001 | 0.0041 | 0.0037 | 0.008 | 33 |
| 1990 | 5 | JP4 | 53.3 | 0.003 | 0.0067 | 0.0059 | 0.012 | 21 |
| 1990 | 8 | JP4 | 11.2 | 0.001 | 0.0055 | 0.0056 | 0.012 | 8 |
| 1991 | 1 | JP4 | 46.4 | 0.002 | 0.0076 | 0.0079 | 0.015 | 36 |
| 1991 | 2 | JP4 | 200.0 | 0.001 | 0.0038 | 0.0039 | 0.014 | 164 |
| 1991 | 3 | JP4 | 803.8 | 0.001 | 0.0047 | 0.0041 | 0.015 | 409 |
| 1991 | 4 | JP4 | 55.0 | 0.001 | 0.0039 | 0.0039 | 0.012 | 93 |
| 1991 | 5 | JP4 | 190.4 | 0.001 | 0.0065 | 0.0062 | 0.014 | 78 |
| 1991 | 8 | JP4 | 59.5 | 0.002 | 0.0062 | 0.0054 | 0.012 | 43 |
| 1992 | 1 | JP4 | 21.2 | 0.003 | 0.0048 | 0.0042 | 0.008 | 17 |
| 1992 | 2 | JP4 | 134.9 | 0.001 | 0.0052 | 0.0054 | 0.014 | 106 |
| 1992 | 3 | JP4 | 502.2 | 0.001 | 0.0042 | 0.0040 | 0.013 | 354 |
| 1992 | 4 | JP4 | 29.4 | 0.001 | 0.0052 | 0.0057 | 0.011 | 75 |
| 1992 | 5 | JP4 | 165.7 | 0.003 | 0.0067 | 0.0075 | 0.015 | 100 |
| 1992 | 8 | JP4 | 5.3 | 0.004 | 0.0055 | 0.0059 | 0.006 | 4 |
| 1993 | 2 | JP4 | 149.7 | 0.001 | 0.0067 | 0.0094 | 0.015 | 84 |
| 1993 | 3 | JP4 | 351.5 | 0.001 | 0.0046 | 0.0048 | 0.014 | 404 |
| 1993 | 4 | JP4 | 90.2 | 0.001 | 0.0046 | 0.0050 | 0.014 | 192 |
| 1993 | 5 | JP4 | 80.3 | 0.001 | 0.0043 | 0.0043 | 0.014 | 85 |
| 1993 | 8 | JP4 | 9.4 | 0.009 | 0.0128 | 0.0129 | 0.015 | 6 |
| 1994 | 2 | JP4 | 72.0 | 0.003 | 0.0063 | 0.0076 | 0.015 | 52 |
| 1994 | 3 | JP4 | 27.2 | 0.002 | 0.0043 | 0.0044 | 0.008 | 18 |
| 1994 | 4 | JP4 | 103.9 | 0.001 | 0.0048 | 0.0045 | 0.015 | 197 |
| 1995 | 4 | JP4 | 61.9 | 0.000 | 0.0048 | 0.0050 | 0.017 | 133 |
| 1995 | 7 | JP4 | 4.9 | 0.006 | 0.0060 | 0.0060 | 0.006 | 1 |
| 1995 | 8 | JP4 | 0.1 | 0.011 | 0.0117 | 0.0125 | 0.013 | 3 |
| 1996 | 8 | JP4 | 0.7 | 0.012 | 0.0130 | 0.0125 | 0.014 | 2 |

*Table 23*

## *Values of JP5 for Total Acid Number by Region*

(Volume in Millions of Gallons)

(Spec = 0.015 mg KOH/g max)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 3 | JP5 | 15.0 | 0.006 | 0.0072 | 0.0072 | 0.010 | 6 |
| 1990 | 5 | JP5 | 32.8 | 0.003 | 0.0062 | 0.0037 | 0.010 | 13 |
| 1991 | 2 | JP5 | 5.9 | 0.005 | 0.0088 | 0.0086 | 0.013 | 9 |
| 1991 | 3 | JP5 | 298.5 | 0.001 | 0.0057 | 0.0058 | 0.015 | 145 |
| 1991 | 5 | JP5 | 159.0 | 0.001 | 0.0050 | 0.0032 | 0.013 | 67 |
| 1992 | 2 | JP5 | 6.0 | 0.007 | 0.0114 | 0.0114 | 0.014 | 8 |
| 1992 | 3 | JP5 | 232.9 | 0.002 | 0.0058 | 0.0060 | 0.014 | 105 |
| 1992 | 5 | JP5 | 137.6 | 0.001 | 0.0056 | 0.0062 | 0.015 | 79 |
| 1993 | 3 | JP5 | 266.9 | 0.001 | 0.0050 | 0.0051 | 0.015 | 121 |
| 1993 | 5 | JP5 | 5.0 | 0.009 | 0.0093 | 0.0092 | 0.010 | 3 |
| 1993 | 7 | JP5 | 55.6 | 0.002 | 0.0044 | 0.0040 | 0.009 | 9 |
| 1994 | 3 | JP5 | 125.4 | 0.001 | 0.0046 | 0.0046 | 0.009 | 49 |
| 1994 | 7 | JP5 | 23.5 | 0.002 | 0.0046 | 0.0050 | 0.009 | 7 |
| 1995 | 3 | JP5 | 10.5 | 0.001 | 0.0034 | 0.0043 | 0.008 | 23 |
| 1995 | 7 | JP5 | 23.1 | 0.004 | 0.0060 | 0.0063 | 0.009 | 8 |
| 1996 | 3 | JP5 | 240.4 | 0.001 | 0.0032 | 0.0031 | 0.013 | 97 |
| 1996 | 5 | JP5 | 29.5 | 0.003 | 0.0052 | 0.0052 | 0.014 | 9 |
| 1996 | 7 | JP5 | 70.6 | 0.003 | 0.0049 | 0.0049 | 0.009 | 22 |
| 1996 | 8 | JP5 | 9.7 | 0.003 | 0.0030 | 0.0030 | 0.003 | 2 |

*Table 24*

## *Values of JP8 for Total Acid Number by Region*

(Volume in Millions of Gallons)

(Spec = 0.015 mg KOH/g max)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 5 | JP8 | 4.0 | 0.003 | 0.0071 | 0.0073 | 0.010 | 7 |
| 1991 | 5 | JP8 | 8.5 | 0.003 | 0.0074 | 0.0072 | 0.012 | 14 |
| 1991 | 8 | JP8 | 3.9 | 0.004 | 0.0040 | 0.0040 | 0.004 | 3 |
| 1992 | 5 | JP8 | 4.4 | 0.004 | 0.0056 | 0.0056 | 0.008 | 7 |
| 1992 | 8 | JP8 | 8.3 | 0.010 | 0.0183 | 0.0172 | 0.020 | 18 |
| 1993 | 3 | JP8 | 53.9 | 0.001 | 0.0039 | 0.0038 | 0.010 | 68 |
| 1993 | 5 | JP8 | 118.4 | 0.001 | 0.0034 | 0.0033 | 0.006 | 63 |
| 1993 | 7 | JP8 | 20.6 | 0.002 | 0.0049 | 0.0056 | 0.009 | 11 |
| 1993 | 8 | JP8 | 20.6 | 0.004 | 0.0109 | 0.0097 | 0.019 | 11 |
| 1994 | 2 | JP8 | 28.5 | 0.002 | 0.0053 | 0.0052 | 0.011 | 20 |
| 1994 | 3 | JP8 | 303.0 | 0.001 | 0.0035 | 0.0034 | 0.020 | 281 |
| 1994 | 5 | JP8 | 151.1 | 0.001 | 0.0022 | 0.0027 | 0.013 | 88 |
| 1994 | 7 | JP8 | 5.7 | 0.002 | 0.0033 | 0.0032 | 0.005 | 3 |
| 1994 | 8 | JP8 | 43.1 | 0.001 | 0.0071 | 0.0051 | 0.020 | 31 |
| 1995 | 1 | JP8 | 2.9 | 0.001 | 0.0024 | 0.0023 | 0.010 | 30 |
| 1995 | 2 | JP8 | 126.6 | 0.002 | 0.0053 | 0.0053 | 0.012 | 83 |
| 1995 | 3 | JP8 | 455.4 | 0.001 | 0.0037 | 0.0035 | 0.012 | 326 |
| 1995 | 4 | JP8 | 9.9 | 0.003 | 0.0065 | 0.0063 | 0.013 | 16 |
| 1995 | 5 | JP8 | 239.3 | 0.001 | 0.0025 | 0.0028 | 0.013 | 154 |
| 1995 | 7 | JP8 | 65.1 | 0.002 | 0.0047 | 0.0050 | 0.009 | 21 |
| 1995 | 8 | JP8 | 96.4 | 0.001 | 0.0147 | 0.0113 | 0.020 | 115 |
| 1996 | 1 | JP8 | 18.8 | 0.001 | 0.0041 | 0.0066 | 0.012 | 61 |
| 1996 | 2 | JP8 | 182.6 | 0.001 | 0.0055 | 0.0054 | 0.014 | 115 |
| 1996 | 3 | JP8 | 608.8 | 0.001 | 0.0041 | 0.0038 | 0.015 | 365 |
| 1996 | 4 | JP8 | 76.4 | 0.001 | 0.0058 | 0.0056 | 0.015 | 80 |
| 1996 | 5 | JP8 | 412.7 | 0.001 | 0.0038 | 0.0040 | 0.015 | 217 |
| 1996 | 6 | JP8 | 39.9 | 0.005 | 0.0058 | 0.0059 | 0.006 | 8 |
| 1996 | 7 | JP8 | 259.5 | 0.001 | 0.0052 | 0.0052 | 0.015 | 106 |
| 1996 | 8 | JP8 | 150.5 | 0.001 | 0.0139 | 0.0090 | 0.020 | 140 |

NATO/CEPS JA1 Min/Max: "0.001 - 0.015". Mean of 0.003 mgKOH/g

*Table 25*

## *Values of JP4 for Smoke Point by Region*

(Volume in Millions of Gallons)

(Spec = 20.0 mm min)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 2 | JP4 | 2.2 | 23 | 23.3 | 23.2 | 24 | 3 |
| 1990 | 3 | JP4 | 14.4 | 25 | 28.5 | 28.4 | 30 | 27 |
| 1990 | 4 | JP4 | 28.1 | 20 | 27.5 | 29.7 | 33 | 33 |
| 1990 | 5 | JP4 | 53.3 | 24 | 27.0 | 27.7 | 31 | 28 |
| 1990 | 8 | JP4 | 11.2 | 21 | 24.4 | 25.2 | 30 | 8 |
| 1991 | 1 | JP4 | 46.4 | 20 | 24.6 | 24.4 | 30 | 36 |
| 1991 | 2 | JP4 | 200.0 | 22 | 27.5 | 28.1 | 31 | 166 |
| 1991 | 3 | JP4 | 803.8 | 20 | 26.7 | 24.8 | 37 | 409 |
| 1991 | 4 | JP4 | 55.0 | 21 | 28.0 | 28.1 | 36 | 93 |
| 1991 | 5 | JP4 | 190.4 | 21 | 26.1 | 26.5 | 31 | 96 |
| 1991 | 8 | JP4 | 59.5 | 20 | 26.0 | 26.4 | 30 | 43 |
| 1992 | 1 | JP4 | 21.2 | 22 | 24.7 | 24.8 | 27 | 17 |
| 1992 | 2 | JP4 | 134.9 | 21 | 26.9 | 28.2 | 31 | 107 |
| 1992 | 3 | JP4 | 502.2 | 20 | 26.6 | 24.5 | 33 | 354 |
| 1992 | 4 | JP4 | 29.4 | 21 | 27.5 | 28.2 | 41 | 78 |
| 1992 | 5 | JP4 | 165.7 | 21 | 26.2 | 26.9 | 35 | 100 |
| 1992 | 8 | JP4 | 5.3 | 21 | 26.6 | 28.1 | 31 | 4 |
| 1993 | 2 | JP4 | 149.7 | 21 | 25.5 | 26.9 | 33 | 84 |
| 1993 | 3 | JP4 | 351.5 | 20 | 26.9 | 24.5 | 38 | 404 |
| 1993 | 4 | JP4 | 90.2 | 23 | 28.3 | 29.8 | 39 | 194 |
| 1993 | 5 | JP4 | 80.3 | 21 | 26.3 | 27.0 | 34 | 85 |
| 1993 | 8 | JP4 | 9.4 | 20 | 20.0 | 20.0 | 20 | 6 |
| 1994 | 2 | JP4 | 72.0 | 22 | 24.5 | 26.2 | 30 | 52 |
| 1994 | 3 | JP4 | 27.2 | 23 | 26.1 | 25.7 | 29 | 18 |
| 1994 | 4 | JP4 | 103.9 | 21 | 27.6 | 25.2 | 37 | 192 |
| 1995 | 4 | JP4 | 61.9 | 20 | 25.9 | 20.6 | 35 | 120 |
| 1995 | 7 | JP4 | 4.9 | 26 | 26.0 | 26.0 | 26 | 1 |
| 1995 | 8 | JP4 | 0.1 | 26 | 26.0 | 26.0 | 26 | 3 |
| 1996 | 8 | JP4 | 0.7 | 26 | 26.0 | 26.0 | 26 | 2 |

*Table 26*

## *Values of JP5 for Smoke Point by Region*

(Volume in Millions of Gallons)

(Spec = 19.0 mm max)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 3 | JP5 | 15.0 | 20 | 20.0 | 20.0 | 20 | 6 |
| 1990 | 5 | JP5 | 32.8 | 19 | 19.5 | 19.5 | 20 | 26 |
| 1991 | 2 | JP5 | 5.9 | 24 | 24.0 | 24.0 | 26 | 9 |
| 1991 | 3 | JP5 | 298.5 | 19 | 21.8 | 21.0 | 25 | 145 |
| 1991 | 5 | JP5 | 159.0 | 19 | 19.3 | 19.3 | 22 | 100 |
| 1992 | 2 | JP5 | 6.0 | 24 | 25.1 | 25.1 | 26 | 8 |
| 1992 | 3 | JP5 | 232.9 | 20 | 21.5 | 20.8 | 25 | 105 |
| 1992 | 5 | JP5 | 137.6 | 19 | 19.8 | 19.8 | 22 | 79 |
| 1993 | 3 | JP5 | 266.9 | 20 | 22.2 | 8.5 | 25 | 68 |
| 1993 | 5 | JP5 | 5.0 | 19 | 20.0 | 19.8 | 20 | 3 |
| 1993 | 7 | JP5 | 55.6 | 21 | 23.2 | 23.4 | 24 | 9 |
| 1994 | 3 | JP5 | 125.4 | 21 | 22.7 | 21.0 | 26 | 10 |
| 1994 | 7 | JP5 | 23.5 | 21 | 22.6 | 15.6 | 23 | 5 |
| 1995 | 3 | JP5 | 10.5 | 19 | 19.5 | 15.9 | 21 | 4 |
| 1995 | 7 | JP5 | 23.1 | 21 | 21.0 | 24.8 | 21 | 3 |
| 1996 | 3 | JP5 | 240. 4 | 19 | 20.1 | 16.1 | 22 | 74 |
| 1996 | 5 | JP5 | 29.5 | 19 | 20.0 | 20.1 | 21 | 9 |
| 1996 | 7 | JP5 | 70.6 | 21 | 22.3 | 17.7 | 25 | 17 |
| 1996 | 8 | JP5 | 9.7 | 21 | 22.0 | 22.0 | 23 | 2 |

*Table 27*

## *Values of JP8 for Smoke Point by Region*

(Volume in Millions of Gallons)

(Spec = 25 mm min or 19 min w/ 3.0% Naphthalenes)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 5 | JP8 | 4.0 | 19 | 19.6 | 19.5 | 20 | 7 |
| 1991 | 5 | JP8 | 8.5 | 19 | 19.3 | 19.3 | 20 | 14 |
| 1991 | 8 | JP8 | 3.9 | 20 | 20.7 | 20.7 | 22 | 3 |
| 1992 | 5 | JP8 | 4.4 | 19 | 19.8 | 19.8 | 21 | 7 |
| 1992 | 8 | JP8 | 8.3 | 19 | 20.9 | 20.6 | 21 | 18 |
| 1993 | 3 | JP8 | 53.9 | 20 | 23.5 | 22.2 | 30 | 69 |
| 1993 | 5 | JP8 | 118.4 | 19 | 20.7 | 20.8 | 23 | 66 |
| 1993 | 7 | JP8 | 20.6 | 24 | 25.5 | 25.1 | 26 | 11 |
| 1993 | 8 | JP8 | 20.6 | 20 | 21.7 | 22.2 | 24 | 11 |
| 1994 | 2 | JP8 | 28.5 | 21 | 23.9 | 23.8 | 26 | 20 |
| 1994 | 3 | JP8 | 303.0 | 19 | 23.6 | 22.3 | 28 | 279 |
| 1994 | 5 | JP8 | 151.1 | 19 | 20.1 | 20.5 | 22 | 88 |
| 1994 | 7 | JP8 | 5.7 | 25 | 25.3 | 25.3 | 26 | 3 |
| 1994 | 8 | JP8 | 43.1 | 19 | 21.3 | 21.4 | 25 | 31 |
| 1995 | 1 | JP8 | 2.9 | 20 | 22.3 | 22.4 | 29 | 30 |
| 1995 | 2 | JP8 | 126.6 | 20 | 24.3 | 24.0 | 26 | 82 |
| 1995 | 3 | JP8 | 455.4 | 20 | 22.9 | 22.2 | 33 | 324 |
| 1995 | 4 | JP8 | 9.9 | 21 | 23.3 | 23.6 | 27 | 16 |
| 1995 | 5 | JP8 | 239.3 | 19 | 20.2 | 20.7 | 23 | 154 |
| 1995 | 7 | JP8 | 65.1 | 19 | 25.3 | 25.4 | 29 | 21 |
| 1995 | 8 | JP8 | 96.4 | 20 | 21.1 | 21.2 | 28 | 114 |
| 1996 | 1 | JP8 | 18.8 | 20 | 21.6 | 22.8 | 23 | 61 |
| 1996 | 2 | JP8 | 182.6 | 20 | 24.5 | 24.3 | 28 | 120 |
| 1996 | 3 | JP8 | 608.8 | 19 | 23.0 | 21.9 | 30 | 364 |
| 1996 | 4 | JP8 | 76.4 | 21 | 24.5 | 24.4 | 29 | 81 |
| 1996 | 5 | JP8 | 412.7 | 19 | 20.3 | 20.5 | 27 | 217 |
| 1996 | 6 | JP8 | 39.9 | 27 | 27.0 | 27.0 | 27 | 8 |
| 1996 | 7 | JP8 | 259.5 | 19 | 25.3 | 24.3 | 27 | 106 |
| 1996 | 8 | JP8 | 150.5 | 20 | 21.9 | 23.3 | 25 | 140 |

NATO/CEPS JA1 Min/Max: "19 - 31 mm". Mean of 24 mm.

*Table 28*

## *Values of JP8 for Naphthalene by Region*

(Volume in Millions of Gallons)

(Spec = 3.0% max)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 5 | JP8 | 4.0 | 1.0 | 1.04 | 1.05 | 1.3 | 7 |
| 1991 | 5 | JP8 | 8.5 | 0.4 | 0.80 | 0.68 | 1.4 | 12 |
| 1991 | 8 | JP8 | 3.9 | 1.0 | 1.30 | 1.30 | 1.5 | 3 |
| 1992 | 5 | JP8 | 4.4 | 0.6 | 1.44 | 1.44 | 2.1 | 7 |
| 1992 | 8 | JP8 | 8.3 | 2.4 | 2.54 | 2.53 | 2.8 | 18 |
| 1993 | 3 | JP8 | 53.9 | 0.1 | 1.33 | 1.30 | 2.9 | 69 |
| 1993 | 5 | JP8 | 118.4 | 0.2 | 1.16 | 0.74 | 2.0 | 59 |
| 1993 | 7 | JP8 | 20.6 | 0.6 | 0.77 | 0.43 | 1.0 | 3 |
| 1993 | 8 | JP8 | 20.6 | 0.5 | 1.51 | 0.94 | 2.7 | 11 |
| 1994 | 2 | JP8 | 28.5 | 1.1 | 1.29 | 0.99 | 1.6 | 16 |
| 1994 | 3 | JP8 | 303.0 | 0.1 | 1.39 | 1.323 | 3.0 | 280 |
| 1994 | 5 | JP8 | 151.1 | 0.2 | 1.34 | 1.06 | 3.0 | 85 |
| 1994 | 7 | JP8 | 5.7 | 0.3 | 0.40 | 0.29 | 0.5 | 2 |
| 1994 | 8 | JP8 | 43.1 | 0.1 | 1.00 | 0.73 | 2.8 | 31 |
| 1995 | 1 | JP8 | 2.9 | 0.5 | 0.89 | 0.87 | 1.7 | 30 |
| 1995 | 2 | JP8 | 126.6 | 0.8 | 1.23 | 0.90 | 2.0 | 61 |
| 1995 | 3 | JP8 | 455.4 | 0.1 | 1.27 | 1.14 | 2.9 | 325 |
| 1995 | 4 | JP8 | 9.9 | 0.1 | 0.67 | 0.41 | 1.1 | 9 |
| 1995 | 5 | JP8 | 239.3 | 0.2 | 1.80 | 1.36 | 3.0 | 154 |
| 1995 | 7 | JP8 | 65.1 | 0.2 | 1.55 | 0.97 | 3 | 10 |
| 1995 | 8 | JP8 | 96.4 | 0.1 | 2.13 | 1.63 | 2.9 | 115 |
| 1996 | 1 | JP8 | 18.8 | 0.8 | 1.39 | 2.01 | 2.9 | 61 |
| 1996 | 2 | JP8 | 182.6 | 0.6 | 1.33 | 1.00 | 2.9 | 90 |
| 1996 | 3 | JP8 | 608.8 | 0.1 | 1.24 | 1.12 | 3.0 | 332 |
| 1996 | 4 | JP8 | 76.4 | 0.7 | 0.93 | 0.39 | 1.1 | 19 |
| 1996 | 5 | JP8 | 412.7 | 0.1 | 1.42 | 0.90 | 3.0 | 215 |
| 1996 | 6 | JP8 | 39.9 | 0.5 | 0.52 | 0.36 | 0.5 | 5 |
| 1996 | 7 | JP8 | 259.5 | 0.1 | 1.57 | 0.83 | 2.9 | 75 |
| 1996 | 8 | JP8 | 150.5 | 0.3 | 2.16 | 1.11 | 3.0 | 123 |

NATO/CEPS JA1 Min/Max: "0.1 - 2.7%". Mean of 1.2%.

*Table 29*

## *Values of JP4 for Hydrogen Content by Region*

(Volume in Millions of Gallons)

(Spec = 13.5% min)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 2 | JP4 | 2.2 | 14.1 | 14.17 | 14.18 | 14.2 | 3 |
| 1990 | 3 | JP4 | 14.4 | 14.1 | 14.36 | 14.46 | 14.6 | 27 |
| 1990 | 4 | JP4 | 28.1 | 13.7 | 14.41 | 14.38 | 14.8 | 33 |
| 1990 | 5 | JP4 | 53.3 | 14.0 | 14.24 | 14.25 | 14.4 | 28 |
| 1990 | 8 | JP4 | 11.2 | 13.9 | 14.30 | 14.23 | 14.8 | 8 |
| 1991 | 1 | JP4 | 46.4 | 14.4 | 14.51 | 14.51 | 14.6 | 36 |
| 1991 | 2 | JP4 | 200.0 | 13.6 | 14.41 | 14.41 | 14.8 | 166 |
| 1991 | 3 | JP4 | 803.8 | 13.7 | 14.38 | 14.32 | 15.5 | 408 |
| 1991 | 4 | JP4 | 55.0 | 13.8 | 14.38 | 13.85 | 14.7 | 88 |
| 1991 | 5 | JP4 | 190.4 | 13.1 | 14.23 | 13.97 | 14.7 | 94 |
| 1991 | 8 | JP4 | 59.5 | 13.6 | 14.36 | 14.36 | 14.7 | 43 |
| 1992 | 1 | JP4 | 21.2 | 14.5 | 14.60 | 14.60 | 14.7 | 17 |
| 1992 | 2 | JP4 | 134.9 | 13.8 | 14.42 | 14.17 | 14.8 | 103 |
| 1992 | 3 | JP4 | 502.2 | 13.8 | 14.38 | 14.25 | 15.2 | 330 |
| 1992 | 4 | JP4 | 29.4 | 12.4 | 14.36 | 11.67 | 14.8 | 61 |
| 1992 | 5 | JP4 | 165.7 | 13.6 | 14.15 | 14.15 | 14.6 | 100 |
| 1992 | 8 | JP4 | 5.3 | 14.0 | 14.28 | 14.35 | 14.5 | 4 |
| 1993 | 2 | JP4 | 149.7 | 13.6 | 14.23 | 13.70 | 14.6 | 83 |
| 1993 | 3 | JP4 | 351.5 | 13.2 | 14.33 | 14.42 | 15.0 | 403 |
| 1993 | 4 | JP4 | 90.2 | 13.5 | 14.30 | 14.32 | 15.3 | 193 |
| 1993 | 5 | JP4 | 80.3 | 13.0 | 14.05 | 14.07 | 14.5 | 85 |
| 1993 | 8 | JP4 | 9.4 | 13.5 | 13.60 | 13.58 | 13.8 | 6 |
| 1994 | 2 | JP4 | 72.0 | 13.8 | 14.28 | 14.21 | 14.6 | 52 |
| 1994 | 3 | JP4 | 27.2 | 13.9 | 14.35 | 14.36 | 14.8 | 18 |
| 1994 | 4 | JP4 | 103.9 | 13.5 | 14.32 | 13.51 | 15.8 | 193 |
| 1995 | 4 | JP4 | 61.9 | 13.9 | 14.29 | 12.01 | 14.6 | 107 |
| 1995 | 7 | JP4 | 4.9 | 14.4 | 14.40 | 14.40 | 14.4 | 1 |
| 1995 | 8 | JP4 | 0.1 | 13.6 | 14.37 | 13.90 | 14.9 | 3 |
| 1996 | 8 | JP4 | 0.7 | 14.3 | 14.30 | 14.30 | 14.3 | 2 |

*Table 30*

## *Values of JP5 for Hydrogen Content by Region*

(Volume in Millions of Gallons)

(Spec = 13.4% min)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 3 | JP5 | 15.0 | 13.5 | 13.60 | 13.61 | 13.7 | 6 |
| 1990 | 5 | JP5 | 32.8 | 13.4 | 13.48 | 13.48 | 13.8 | 26 |
| 1991 | 2 | JP5 | 5.9 | 13.8 | 13.82 | 13.81 | 13.9 | 9 |
| 1991 | 3 | JP5 | 298.5 | 13.4 | 13.95 | 13.98 | 15.1 | 145 |
| 1991 | 5 | JP5 | 159.0 | 13.4 | 13.60 | 13.61 | 14.1 | 100 |
| 1992 | 2 | JP5 | 6.0 | 13.4 | 13.74 | 13.73 | 13.9 | 8 |
| 1992 | 3 | JP5 | 232.9 | 13.4 | 13.84 | 13.83 | 15.2 | 105 |
| 1992 | 5 | JP5 | 137.6 | 13.4 | 13.46 | 13.46 | 14.7 | 79 |
| 1993 | 3 | JP5 | 266.9 | 13.4 | 13.87 | 13.87 | 14.7 | 123 |
| 1993 | 5 | JP5 | 5.0 | 13.7 | 13.70 | 13.70 | 13.7 | 3 |
| 1993 | 7 | JP5 | 55.6 | 13.7 | 13.86 | 13.87 | 14.2 | 9 |
| 1994 | 3 | JP5 | 125.4 | 13.6 | 13.76 | 13.76 | 14.1 | 49 |
| 1994 | 7 | JP5 | 23.5 | 13.8 | 14.00 | 14.01 | 14.4 | 7 |
| 1995 | 3 | JP5 | 10.5 | 13.6 | 13.84 | 13.77 | 14.0 | 23 |
| 1995 | 7 | JP5 | 23.1 | 13.7 | 13.85 | 13.83 | 14.0 | 8 |
| 1996 | 3 | JP5 | 240.4 | 13.5 | 13.94 | 13.96 | 14.5 | 98 |
| 1996 | 5 | JP5 | 29.5 | 13.4 | 13.56 | 13.30 | 13.6 | 8 |
| 1996 | 7 | JP5 | 70.64 | 13.4 | 14.02 | 14.02 | 15.1 | 22 |
| 1996 | 8 | JP5 | 9.7 | 13.8 | 13.85 | 13.85 | 13.9 | 2 |

*Table 31*

## *Values of JP8 for Hydrogen Content by Region*

(Volume in Millions of Gallons)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 5 | JP8 | 4.0 | 13.4 | 13.53 | 13.54 | 13.8 | 7 |
| 1991 | 5 | JP8 | 8.5 | 13.4 | 13.55 | 13.55 | 13.9 | 14 |
| 1991 | 8 | JP8 | 3.9 | 13.6 | 13.60 | 13.60 | 13.6 | 3 |
| 1992 | 5 | JP8 | 4.4 | 13.4 | 13.49 | 13.49 | 13.6 | 7 |
| 1992 | 8 | JP8 | 8.3 | 13.4 | 13.67 | 13.65 | 13.8 | 18 |
| 1993 | 3 | JP8 | 53.9 | 13.4 | 13.73 | 13.11 | 14.1 | 66 |
| 1993 | 5 | JP8 | 118.4 | 13.4 | 13.57 | 13.63 | 13.9 | 66 |
| 1993 | 7 | JP8 | 20.6 | 13.5 | 13.67 | 13.71 | 13.9 | 11 |
| 1993 | 8 | JP8 | 20.6 | 13.6 | 13.75 | 13.77 | 14.1 | 11 |
| 1994 | 2 | JP8 | 28.5 | 13.6 | 13.89 | 13.91 | 14.0 | 20 |
| 1994 | 3 | JP8 | 303.0 | 13.4 | 13.74 | 13.70 | 14.2 | 281 |
| 1994 | 5 | JP8 | 151.1 | 13.4 | 13.60 | 13.63 | 14.7 | 88 |
| 1994 | 7 | JP8 | 5.7 | 13.8 | 13.90 | 13.91 | 14.0 | 3 |
| 1994 | 8 | JP8 | 43.1 | 13.4 | 13.68 | 13.66 | 14.0 | 31 |
| 1995 | 1 | JP8 | 2.9 | 13.5 | 13.60 | 13.61 | 13.8 | 30 |
| 1995 | 2 | JP8 | 126.6 | 13.6 | 13.87 | 13.87 | 14.1 | 83 |
| 1995 | 3 | JP8 | 455.4 | 13.4 | 13.79 | 13.79 | 14.5 | 326 |
| 1995 | 4 | JP8 | 9.9 | 13.6 | 13.81 | 13.83 | 14.0 | 16 |
| 1995 | 5 | JP8 | 239.3 | 13.4 | 13.56 | 13.62 | 14.5 | 154 |
| 1995 | 7 | JP8 | 65.1 | 13.7 | 13.89 | 13.90 | 14.2 | 21 |
| 1995 | 8 | JP8 | 96.4 | 13.5 | 13.80 | 13.84 | 14.2 | 115 |
| 1996 | 1 | JP8 | 18.8 | 13.5 | 13.64 | 13.78 | 14.3 | 61 |
| 1996 | 2 | JP8 | 182.6 | 13.5 | 13.87 | 13.87 | 14.8 | 120 |
| 1996 | 3 | JP8 | 608.8 | 13.4 | 13.77 | 13.73 | 14.3 | 366 |
| 1996 | 4 | JP8 | 76.4 | 13.4 | 13.80 | 13.78 | 14.1 | 81 |
| 1996 | 5 | JP8 | 412.7 | 12.4 | 13.62 | 13.68 | 14.7 | 217 |
| 1996 | 6 | JP8 | 39.9 | 14.0 | 14.10 | 14.09 | 14.3 | 8 |
| 1996 | 7 | JP8 | 259.5 | 13.4 | 13.86 | 13.95 | 15.0 | 106 |
| 1996 | 8 | JP8 | 150.5 | 13.4 | 13.89 | 13.95 | 14.2 | 140 |

NATO/CEPS JA1 Min/Max: "13.4 - 14.4%". Mean of 13.7%.

*Table 32*

## *Values of JP5 for Distillation 10% Recovered by Region*

(Volume in Millions of Gallons)

(Spec = 205°C max, "R" Revision = 206°C max)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 3 | JP5 | 15.0 | 187 | 190.83 | 190.85 | 194 | 6 |
| 1990 | 5 | JP5 | 32.8 | 193 | 197.24 | 197.32 | 199 | 26 |
| 1991 | 2 | JP5 | 5.9 | 187 | 192.67 | 192.85 | 194 | 9 |
| 1991 | 3 | JP5 | 298.5 | 184 | 191.98 | 191.77 | 205 | 145 |
| 1991 | 5 | JP5 | 159.0 | 183 | 197.26 | 197.24 | 201 | 100 |
| 1992 | 2 | JP5 | 6.0 | 192 | 194.38 | 194.30 | 196 | 8 |
| 1992 | 3 | JP5 | 232.9 | 186 | 191.98 | 191.79 | 203 | 105 |
| 1992 | 5 | JP5 | 137.6 | 172 | 193.17 | 193.74 | 202 | 79 |
| 1993 | 3 | JP5 | 266.9 | 93 | 187.97 | 186.29 | 202 | 123 |
| 1993 | 5 | JP5 | 5.0 | 190 | 190.33 | 190.75 | 191 | 3 |
| 1993 | 7 | JP5 | 55.6 | 185 | 198.77 | 199.58 | 204 | 9 |
| 1994 | 3 | JP5 | 125.4 | 164 | 172.76 | 169.94 | 202 | 49 |
| 1994 | 7 | JP5 | 23.5 | 187 | 197.29 | 196.42 | 202 | 7 |
| 1995 | 3 | JP5 | 10.5 | 171 | 176.17 | 191.96 | 198 | 23 |
| 1995 | 7 | JP5 | 23.1 | 186 | 195.99 | 197.76 | 203 | 8 |
| 1996 | 3 | JP5 | 240.4 | 169 | 173.55 | 173.42 | 194 | 98 |
| 1996 | 5 | JP5 | 29.5 | 169 | 192.67 | 189.49 | 199 | 9 |
| 1996 | 7 | JP5 | 70.6 | 179 | 190.91 | 190.71 | 200 | 22 |
| 1996 | 8 | JP5 | 9.7 | 189 | 189.50 | 189.50 | 191 | 2 |

*Table 33*

## *Values of JP8 for Distillation 10% Recovered by Region*

(Volume in Millions of Gallons)

(Spec = 205°C max)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 5 | JP8 | 4.0 | 193 | 196.64 | 196.45 | 199 | 7 |
| 1991 | 5 | JP8 | 8.5 | 195 | 197.56 | 197.59 | 200 | 14 |
| 1991 | 8 | JP8 | 3.9 | 155 | 162.50 | 162.50 | 167 | 3 |
| 1992 | 5 | JP8 | 4.4 | 195 | 197.46 | 197.46 | 199 | 7 |
| 1992 | 8 | JP8 | 8.3 | 163 | 165.40 | 165.43 | 174 | 18 |
| 1993 | 3 | JP8 | 53.9 | 167 | 181.54 | 184.43 | 199 | 69 |
| 1993 | 5 | JP8 | 118.4 | 63 | 149.49 | 154.23 | 177 | 66 |
| 1993 | 7 | JP8 | 20.6 | 164 | 173.36 | 174.39 | 185 | 11 |
| 1993 | 8 | JP8 | 20.6 | 162 | 165.22 | 165.94 | 167 | 11 |
| 1994 | 2 | JP8 | 28.5 | 175 | 182.50 | 183.18 | 194 | 20 |
| 1994 | 3 | JP8 | 303.0 | 165 | 182.19 | 181.50 | 199 | 281 |
| 1994 | 5 | JP8 | 151.1 | 141 | 149.92 | 156.40 | 177 | 88 |
| 1994 | 7 | JP8 | 5.7 | 163 | 168.33 | 168.82 | 171 | 3 |
| 1994 | 8 | JP8 | 43.1 | 161 | 167.84 | 167.67 | 174 | 31 |
| 1995 | 1 | JP8 | 2.9 | 177 | 185.40 | 184.91 | 197 | 30 |
| 1995 | 2 | JP8 | 126.6 | 176 | 182.91 | 182.85 | 191 | 83 |
| 1995 | 3 | JP8 | 455.4 | 150 | 181.12 | 178.84 | 197 | 326 |
| 1995 | 4 | JP8 | 9.9 | 171 | 178.38 | 178.08 | 188 | 16 |
| 1995 | 5 | JP8 | 239.3 | 141 | 154.14 | 158.60 | 190 | 154 |
| 1995 | 7 | JP8 | 65.1 | 164 | 176.79 | 178.28 | 198 | 21 |
| 1995 | 8 | JP8 | 96.4 | 160 | 167.44 | 165.98 | 175 | 115 |
| 1996 | 1 | JP8 | 18.8 | 167 | 183.02 | 173.37 | 197 | 61 |
| 1996 | 2 | JP8 | 182.6 | 168 | 180.28 | 180.50 | 191 | 120 |
| 1996 | 3 | JP8 | 608.8 | 161 | 180.65 | 180.06 | 196 | 366 |
| 1996 | 4 | JP8 | 76.4 | 158 | 171.04 | 170.78 | 188 | 81 |
| 1996 | 5 | JP8 | 412.7 | 148 | 166.49 | 163.33 | 198 | 217 |
| 1996 | 6 | JP8 | 39.9 | 162 | 165.13 | 164.96 | 168 | 8 |
| 1996 | 7 | JP8 | 259.5 | 164 | 172.31 | 172.31 | 193 | 106 |
| 1996 | 8 | JP8 | 150.5 | 158 | 165.73 | 166.85 | 183 | 140 |

NATO/CEPS JA1 Min/Max: "157.0 - 199.0°C" Mean of 171°C

*Table 34*

## *Values of JP4 for Distillation 50% Recovered by Region*

(Volume in Millions of Gallons)

(Spec = 190°C max, "R" = 125°C, min)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 2 | JP4 | 2.2 | 117 | 139.07 | 129.69 | 151 | 3 |
| 1990 | 3 | JP4 | 14.4 | 111 | 121.27 | 141.82 | 157 | 27 |
| 1990 | 4 | JP4 | 28.1 | 117 | 130.53 | 135.49 | 153 | 33 |
| 1990 | 5 | JP4 | 53.3 | 118 | 126.05 | 123.29 | 140 | 28 |
| 1990 | 8 | JP4 | 11.2 | 105 | 112.63 | 116.12 | 127 | 8 |
| 1991 | 1 | JP4 | 46.4 | 122 | 135.17 | 134.47 | 162 | 36 |
| 1991 | 2 | JP4 | 200.0 | 99 | 135.23 | 129.38 | 162 | 163 |
| 1991 | 3 | JP4 | 803.8 | 108 | 135.78 | 138.40 | 174 | 409 |
| 1991 | 4 | JP4 | 55.0 | 116 | 140.15 | 143.49 | 164 | 93 |
| 1991 | 5 | JP4 | 190.4 | 115 | 129.37 | 128.37 | 154 | 96 |
| 1991 | 8 | JP4 | 59.5 | 107 | 111.34 | 112.77 | 122 | 43 |
| 1992 | 1 | JP4 | 21.2 | 132 | 140.16 | 140.52 | 151 | 17 |
| 1992 | 2 | JP4 | 134.9 | 98 | 135.03 | 133.56 | 161 | 107 |
| 1992 | 3 | JP4 | 502.2 | 102 | 136.39 | 141.44 | 214 | 354 |
| 1992 | 4 | JP4 | 29.4 | 103 | 138.66 | 138.87 | 165 | 78 |
| 1992 | 5 | JP4 | 165.7 | 115 | 133.60 | 130.02 | 165 | 100 |
| 1992 | 8 | JP4 | 5.3 | 113 | 122.50 | 117.03 | 145 | 4 |
| 1993 | 2 | JP4 | 149.7 | 92 | 118.16 | 107.83 | 137 | 83 |
| 1993 | 3 | JP4 | 351.5 | 106 | 136.86 | 149.10 | 218 | 404 |
| 1993 | 4 | JP4 | 90.2 | 103 | 131.33 | 129.04 | 162 | 194 |
| 1993 | 5 | JP4 | 80.3 | 99 | 129.06 | 125.48 | 153 | 85 |
| 1994 | 2 | JP4 | 72.0 | 98 | 121.05 | 115.14 | 135 | 52 |
| 1994 | 3 | JP4 | 27.2 | 127 | 154.37 | 156.03 | 175 | 18 |
| 1994 | 4 | JP4 | 103.9 | 101 | 135.92 | 135.48 | 181 | 204 |
| 1995 | 4 | JP4 | 61.9 | 120 | 138.23 | 139.19 | 178 | 134 |
| 1995 | 7 | JP4 | 4.9 | 131 | 131.00 | 131.00 | 131 | 1 |
| 1995 | 8 | JP4 | 0.1 | 119 | 124.00 | 126.17 | 127 | 3 |
| 1996 | 8 | JP4 | 0.7 | 121 | 122.00 | 122.50 | 123 | 2 |

*Table 35*

## *Values of JP4 for Distillation 90% Recovered by Region*

(Volume in Millions of Gallons)

(Spec = 245°C max, "R" = Report)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 2 | JP4 | 2.2 | 153 | 204.26 | 182.14 | 231 | 3 |
| 1990 | 3 | JP4 | 14.4 | 150 | 173.54 | 213.84 | 223 | 27 |
| 1990 | 4 | JP4 | 28.1 | 165 | 190.72 | 182.62 | 226 | 33 |
| 1990 | 5 | JP4 | 53.3 | 164 | 189.27 | 186.72 | 211 | 28 |
| 1990 | 8 | JP4 | 11.2 | 148 | 187.39 | 185.02 | 220 | 8 |
| 1991 | 1 | JP4 | 46.4 | 216 | 222.30 | 222.21 | 228 | 36 |
| 1991 | 2 | JP4 | 200.0 | 151 | 218.42 | 213.21 | 244 | 163 |
| 1991 | 3 | JP4 | 803.8 | 150 | 212.23 | 219.96 | 232 | 409 |
| 1991 | 4 | JP4 | 55.0 | 166 | 195.94 | 193.35 | 226 | 93 |
| 1991 | 5 | JP4 | 190.4 | 154 | 194.02 | 196.61 | 249 | 96 |
| 1991 | 8 | JP4 | 59.5 | 156 | 192.88 | 184.56 | 231 | 43 |
| 1992 | 1 | JP4 | 21.2 | 217 | 224.09 | 223.85 | 229 | 17 |
| 1992 | 2 | JP4 | 134.9 | 197 | 222.76 | 221.73 | 238 | 107 |
| 1992 | 3 | JP4 | 502.2 | 165 | 213.63 | 219.66 | 232 | 354 |
| 1992 | 4 | JP4 | 29.4 | 167 | 195.13 | 201.14 | 223 | 78 |
| 1992 | 5 | JP4 | 165.7 | 160 | 207.32 | 204.35 | 244 | 100 |
| 1992 | 8 | JP4 | 5.3 | 194 | 204.25 | 198.24 | 229 | 4 |
| 1993 | 2 | JP4 | 149.7 | 171 | 222.02 | 218.91 | 234 | 83 |
| 1993 | 3 | JP4 | 351.5 | 171 | 215.89 | 216.64 | 247 | 404 |
| 1993 | 4 | JP4 | 90.2 | 138 | 188.13 | 193.11 | 231 | 194 |
| 1993 | 5 | JP4 | 80.3 | 193 | 218.60 | 216.52 | 242 | 85 |
| 1994 | 2 | JP4 | 72.0 | 154 | 199.19 | 205.00 | 229 | 52 |
| 1994 | 3 | JP4 | 27.2 | 184 | 207.73 | 203.05 | 225 | 18 |
| 1994 | 4 | JP4 | 103.9 | 147 | 193.71 | 196.58 | 236 | 204 |
| 1995 | 4 | JP4 | 61.9 | 165 | 201.41 | 201.73 | 237 | 134 |
| 1995 | 7 | JP4 | 4.9 | 206 | 206.00 | 206.00 | 206 | 1 |
| 1995 | 8 | JP4 | 0.1 | 237 | 239.33 | 239.58 | 241 | 3 |
| 1996 | 8 | JP4 | 0.7 | 239 | 240.50 | 241.26 | 242 | 2 |

*Table 36*

## *Values of JP4 for Final Boiling Point by Region*

(Volume in Millions of Gallons)

(Spec = 270°C max)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 2 | JP4 | 2.2 | 183 | 233.33 | 211.85 | 260 | 3 |
| 1990 | 3 | JP4 | 14.4 | 209 | 227.81 | 249.17 | 261 | 27 |
| 1990 | 4 | JP4 | 28.1 | 203 | 234.84 | 225.69 | 261 | 33 |
| 1990 | 5 | JP4 | 53.3 | 187 | 234.18 | 237.60 | 269 | 28 |
| 1990 | 8 | JP4 | 11.2 | 212 | 240.32 | 236.63 | 263 | 8 |
| 1991 | 1 | JP4 | 46.4 | 242 | 256.71 | 257.08 | 266 | 36 |
| 1991 | 2 | JP4 | 200.0 | 185 | 257.95 | 251.37 | 282 | 163 |
| 1991 | 3 | JP4 | 803.8 | 194 | 245.85 | 250.83 | 266 | 409 |
| 1991 | 4 | JP4 | 55.0 | 203 | 232.47 | 228.60 | 262 | 93 |
| 1991 | 5 | JP4 | 190.4 | 180 | 238.93 | 244.70 | 294 | 96 |
| 1991 | 8 | JP4 | 59.5 | 214 | 244.13 | 240.53 | 266 | 43 |
| 1992 | 1 | JP4 | 21.2 | 254 | 259.38 | 259.86 | 264 | 17 |
| 1992 | 2 | JP4 | 134.9 | 231 | 259.73 | 258.01 | 278 | 107 |
| 1992 | 3 | JP4 | 502.2 | 180 | 246.91 | 249.72 | 266 | 355 |
| 1992 | 4 | JP4 | 29.4 | 205 | 231.97 | 235.81 | 268 | 78 |
| 1992 | 5 | JP4 | 165.7 | 184 | 266.53 | 273.99 | 305 | 100 |
| 1992 | 8 | JP4 | 5.3 | 250 | 255.00 | 251.86 | 268 | 4 |
| 1993 | 2 | JP4 | 149.7 | 210 | 257.41 | 253.71 | 269 | 83 |
| 1993 | 3 | JP4 | 351.5 | 218 | 249.49 | 250.40 | 266 | 404 |
| 1993 | 4 | JP4 | 90.2 | 162 | 228.42 | 234.21 | 266 | 193 |
| 1993 | 5 | JP4 | 80.3 | 240 | 287.40 | 291.60 | 318 | 85 |
| 1994 | 2 | JP4 | 72.0 | 193 | 242.46 | 247.63 | 265 | 52 |
| 1994 | 3 | JP4 | 27.2 | 234 | 247.63 | 250.49 | 258 | 18 |
| 1994 | 4 | JP4 | 103.9 | 172 | 231.28 | 235.13 | 267 | 204 |
| 1995 | 4 | JP4 | 61.9 | 201 | 238.76 | 239.60 | 269 | 134 |
| 1995 | 7 | JP4 | 4.9 | 243 | 243.00 | 243.00 | 243 | 1 |
| 1995 | 8 | JP4 | 0.1 | 264 | 266.67 | 268.00 | 269 | 3 |
| 1996 | 8 | JP4 | 0.7 | 263 | 263.50 | 263.25 | 264 | 2 |

*Table 37*

## *Values of JP5 for Final Boiling Point by Region*

(Volume in Millions of Gallons)

(Spec = 300°C max)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 3 | JP5 | 15.0 | 266 | 268.83 | 268.89 | 272 | 6 |
| 1990 | 5 | JP5 | 32.8 | 238 | 251.70 | 251.50 | 257 | 26 |
| 1991 | 2 | JP5 | 5.9 | 238 | 243.00 | 243.46 | 249 | 9 |
| 1991 | 3 | JP5 | 298.5 | 236 | 235.58 | 248.68 | 281 | 145 |
| 1991 | 5 | JP5 | 159.0 | 247 | 255.40 | 256.01 | 272 | 100 |
| 1992 | 2 | JP5 | 6.0 | 246 | 253.38 | 253.28 | 260 | 8 |
| 1992 | 3 | JP5 | 232.9 | 190 | 255.27 | 252.21 | 347 | 105 |
| 1992 | 5 | JP5 | 137.6 | 251 | 261.72 | 263.05 | 304 | 79 |
| 1993 | 3 | JP5 | 266.9 | 234 | 250.69 | 250.34 | 306 | 123 |
| 1993 | 5 | JP5 | 5.0 | 272 | 276.67 | 279.60 | 282 | 3 |
| 1993 | 7 | JP5 | 55.6 | 249 | 256.56 | 257.26 | 260 | 9 |
| 1994 | 3 | JP5 | 125.4 | 241 | 273.36 | 276.14 | 309 | 49 |
| 1994 | 7 | JP5 | 23.5 | 245 | 255.57 | 254.97 | 260 | 7 |
| 1995 | 3 | JP5 | 10.5 | 266 | 276.04 | 270.68 | 287 | 23 |
| 1995 | 7 | JP5 | 23.1 | 244 | 255.05 | 255.77 | 263 | 8 |
| 1996 | 3 | JP5 | 240.4 | 254 | 278.11 | 278.10 | 286 | 98 |
| 1996 | 5 | JP5 | 29.5 | 255 | 265.89 | 275.61 | 312 | 9 |
| 1996 | 7 | JP5 | 70.6 | 233 | 251.13 | 251.28 | 261 | 22 |
| 1996 | 8 | JP5 | 9.7 | 258 | 259.25 | 259.25 | 261 | 2 |

*Table 38*

## *Values of JP8 for Final Boiling Point by Region*

(Volume in Millions of Gallons)

(Spec = 300°C max)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 5 | JP8 | 4.0 | 238 | 250.07 | 249.73 | 257 | 7 |
| 1991 | 5 | JP8 | 8.5 | 251 | 254.34 | 254.39 | 259 | 14 |
| 1991 | 8 | JP8 | 3.9 | 244 | 254.50 | 254.50 | 260 | 3 |
| 1992 | 5 | JP8 | 4.4 | 251 | 254.47 | 254.47 | 258 | 7 |
| 1992 | 8 | JP8 | 8.3 | 256 | 266.57 | 265.20 | 269 | 18 |
| 1993 | 3 | JP8 | 53.9 | 242 | 259.60 | 264.55 | 277 | 69 |
| 1993 | 5 | JP8 | 118.4 | 208 | 304.76 | 297.74 | 318 | 66 |
| 1993 | 7 | JP8 | 20.6 | 236 | 247.18 | 247.82 | 256 | 11 |
| 1993 | 8 | JP8 | 20.6 | 267 | 276.09 | 277.45 | 282 | 11 |
| 1994 | 2 | JP8 | 28.5 | 245 | 253.45 | 253.83 | 272 | 20 |
| 1994 | 3 | JP8 | 303.0 | 224 | 258.14 | 260.11 | 278 | 281 |
| 1994 | 5 | JP8 | 151.1 | 270 | 302.73 | 294.46 | 326 | 88 |
| 1994 | 7 | JP8 | 5.7 | 232 | 233.67 | 233.46 | 236 | 3 |
| 1994 | 8 | JP8 | 43.1 | 267 | 280.57 | 282.15 | 294 | 31 |
| 1995 | 1 | JP8 | 2.9 | 256 | 265.10 | 264.68 | 279 | 30 |
| 1995 | 2 | JP8 | 126.6 | 246 | 255.33 | 255.31 | 272 | 83 |
| 1995 | 3 | JP8 | 455.4 | 214 | 263.16 | 264.98 | 283 | 326 |
| 1995 | 4 | JP8 | 9.9 | 236 | 255.38 | 256.70 | 289 | 16 |
| 1995 | 5 | JP8 | 239.3 | 209 | 301.57 | 293.65 | 330 | 154 |
| 1995 | 7 | JP8 | 65.1 | 233 | 246.72 | 248.49 | 261 | 21 |
| 1995 | 8 | JP8 | 96.4 | 264 | 274.91 | 277.50 | 296 | 115 |
| 1996 | 1 | JP8 | 18.8 | 250 | 261.69 | 256.92 | 272 | 61 |
| 1996 | 2 | JP8 | 182.6 | 221 | 254.33 | 254.91 | 275 | 120 |
| 1996 | 3 | JP8 | 608.8 | 238 | 262.97 | 265.36 | 284 | 366 |
| 1996 | 4 | JP8 | 76.4 | 235 | 259.53 | 261.96 | 276 | 81 |
| 1996 | 5 | JP8 | 412.7 | 255 | 290.29 | 293.41 | 319 | 217 |
| 1996 | 6 | JP8 | 39.9 | 278 | 283.13 | 282.76 | 290 | 8 |
| 1996 | 7 | JP8 | 259.5 | 231 | 255.36 | 255.28 | 300 | 106 |
| 1996 | 8 | JP8 | 150.5 | 248 | 273.01 | 271.01 | 290 | 140 |

NATO/CEPS JA1 Min/Max: "223.0 - 280.0°C". Mean of 252°C.

*Table 39*

## *Values of JP5 for Flash Point by Region*

(Volume in Millions of Gallons)

(Spec = 60°C min)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 3 | JP5 | 15.0 | 61 | 63.15 | 63.05 | 64 | 6 |
| 1990 | 5 | JP5 | 32.8 | 61 | 62.82 | 62.95 | 63 | 26 |
| 1991 | 2 | JP5 | 5.9 | 62 | 64.08 | 64.00 | 68 | 9 |
| 1991 | 3 | JP5 | 298.5 | 60 | 63.70 | 63.78 | 69 | 145 |
| 1991 | 5 | JP5 | 159.0 | 60 | 62.73 | 62.64 | 71 | 100 |
| 1992 | 2 | JP5 | 6.0 | 62 | 65.42 | 65.29 | 69 | 8 |
| 1992 | 3 | JP5 | 232.9 | 60 | 63.57 | 63.90 | 70 | 105 |
| 1992 | 5 | JP5 | 137.6 | 60 | 64.57 | 64.34 | 71 | 79 |
| 1993 | 3 | JP5 | 266.9 | 60 | 63.28 | 63.29 | 69 | 123 |
| 1993 | 4 | JP5 | 0.4 | 64 | 64.44 | 64.44 | 64 | 1 |
| 1993 | 5 | JP5 | 5.0 | 63 | 63.67 | 63.05 | 65 | 3 |
| 1993 | 7 | JP5 | 55.6 | 61 | 68.00 | 68.08 | 70 | 9 |
| 1994 | 3 | JP5 | 125.4 | 60 | 62.59 | 62.73 | 65 | 49 |
| 1994 | 7 | JP5 | 23.5 | 62 | 65.86 | 65.46 | 70 | 7 |
| 1995 | 3 | JP5 | 10.5 | 60 | 61.53 | 63.23 | 65 | 23 |
| 1995 | 7 | JP5 | 23.1 | 61 | 67.25 | 68.29 | 72 | 8 |
| 1996 | 3 | JP5 | 240.4 | 60 | 62.07 | 62.08 | 65 | 98 |
| 1996 | 5 | JP5 | 29.5 | 60 | 61.22 | 61.78 | 63 | 9 |
| 1996 | 7 | JP5 | 70.6 | 60 | 63.82 | 63.77 | 70 | 22 |
| 1996 | 8 | JP5 | 9.7 | 62 | 62.00 | 62.00 | 62 | 2 |

## *Table 40*

### *Values of JP8 for Flash Point by Region*

(Volume in Millions of Gallons)

(Spec = 38°C min)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 5 | JP8 | 4.0 | 40 | 50.73 | 48.53 | 64 | 7 |
| 1991 | 5 | JP8 | 8.5 | 41 | 58.52 | 58.39 | 64 | 14 |
| 1991 | 8 | JP8 | 3.9 | 40 | 39.83 | 39.83 | 41 | 3 |
| 1992 | 5 | JP8 | 4.4 | 60 | 62.06 | 62.07 | 63 | 7 |
| 1992 | 8 | JP8 | 8.3 | 40 | 41.12 | 41.12 | 43 | 18 |
| 1993 | 3 | JP8 | 53.9 | 42 | 50.56 | 52.39 | 60 | 69 |
| 1993 | 5 | JP8 | 118.4 | 43 | 46.11 | 46.82 | 54 | 66 |
| 1993 | 7 | JP8 | 20.6 | 44 | 50.27 | 50.00 | 61 | 11 |
| 1993 | 8 | JP8 | 20.6 | 39 | 40.90 | 40.21 | 43 | 11 |
| 1994 | 2 | JP8 | 28.5 | 42 | 53.05 | 52.60 | 60 | 20 |
| 1994 | 3 | JP8 | 303.0 | 40 | 52.38 | 52.81 | 68 | 281 |
| 1994 | 5 | JP8 | 151.1 | 42 | 46.28 | 47.23 | 56 | 88 |
| 1994 | 7 | JP8 | 5.7 | 45 | 46.33 | 46.45 | 47 | 3 |
| 1994 | 8 | JP8 | 43.1 | 39 | 40.90 | 40.77 | 43 | 31 |
| 1995 | 1 | JP8 | 2.9 | 40 | 52.80 | 52.39 | 63 | 30 |
| 1995 | 2 | JP8 | 126.6 | 40 | 51.65 | 51.77 | 59 | 83 |
| 1995 | 3 | JP8 | 455.4 | 38 | 51.14 | 50.43 | 66 | 326 |
| 1995 | 4 | JP8 | 9.9 | 43 | 47.20 | 47.01 | 51 | 16 |
| 1995 | 5 | JP8 | 239.3 | 44 | 49.52 | 50.52 | 63 | 154 |
| 1995 | 7 | JP8 | 65.1 | 42 | 49.93 | 50.50 | 69 | 21 |
| 1995 | 8 | JP8 | 96.4 | 38 | 40.99 | 40.68 | 46 | 115 |
| 1996 | 1 | JP8 | 18.8 | 40 | 49.54 | 43.15 | 60 | 61 |
| 1996 | 2 | JP8 | 182.6 | 42 | 51.12 | 51.02 | 66 | 120 |
| 1996 | 3 | JP8 | 608.8 | 39 | 50.53 | 49.99 | 70 | 366 |
| 1996 | 4 | JP8 | 76.4 | 38 | 45.36 | 44.88 | 64 | 81 |
| 1996 | 5 | JP8 | 412.7 | 40 | 48.68 | 49.77 | 62 | 217 |
| 1996 | 6 | JP8 | 39.9 | 42 | 45.25 | 45.39 | 51 | 8 |
| 1996 | 7 | JP8 | 259.5 | 39 | 44.81 | 45.51 | 64 | 106 |
| 1996 | 8 | JP8 | 150.5 | 38 | 41.97 | 43.72 | 50 | 140 |

NATO/CEPS JA1 Min/Max: "38 - 74.0°C". Mean of 43.6°C.

*Table 41*

## *Values of JP5 for Cetane Index by Region*

(Volume in Millions of Gallons)

(Spec = Report)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 3 | JP5 | 15.0 | 40.9 | 42.32 | 42.43 | 44.5 | 6 |
| 1990 | 5 | JP5 | 32.8 | 39.8 | 40.35 | 40.36 | 40.8 | 26 |
| 1991 | 2 | JP5 | 5.9 | 35.8 | 43.62 | 44.08 | 45.0 | 9 |
| 1991 | 3 | JP5 | 298.5 | 39.5 | 44.38 | 43.56 | 48.0 | 142 |
| 1991 | 5 | JP5 | 159.0 | 33.2 | 40.31 | 40.24 | 41.7 | 100 |
| 1992 | 2 | JP5 | 6.0 | 42.8 | 44.26 | 44.25 | 45.0 | 8 |
| 1992 | 3 | JP5 | 232.9 | 39.4 | 43.75 | 42.29 | 47.0 | 101 |
| 1992 | 5 | JP5 | 137.6 | 37.0 | 40.87 | 40.90 | 42.6 | 79 |
| 1993 | 3 | JP5 | 266.9 | 42.0 | 45.65 | 45.85 | 64.6 | 122 |
| 1993 | 4 | JP5 | 0.4 | 45.3 | 45.30 | 45.30 | 45.3 | 1 |
| 1993 | 5 | JP5 | 5.0 | 36.3 | 36.57 | 36.39 | 37.0 | 3 |
| 1993 | 7 | JP5 | 55.6 | 23.0 | 40.83 | 41.85 | 44.5 | 9 |
| 1994 | 3 | JP5 | 125.4 | 40.8 | 43.98 | 44.13 | 47.7 | 49 |
| 1994 | 7 | JP5 | 23.5 | 43.0 | 44.36 | 44.35 | 45.5 | 7 |
| 1995 | 3 | JP5 | 10.5 | 36.0 | 45.37 | 38.78 | 48.0 | 23 |
| 1995 | 7 | JP5 | 23.1 | 41.1 | 44.54 | 44.16 | 46.0 | 8 |
| 1996 | 3 | JP5 | 240.4 | 24.9 | 46.53 | 46.36 | 48.8 | 97 |
| 1996 | 5 | JP5 | 29.5 | 39.0 | 42.00 | 42.76 | 47.1 | 9 |
| 1996 | 7 | JP5 | 70.6 | 40.8 | 44.24 | 44.15 | 47.5 | 22 |
| 1996 | 8 | JP5 | 9.7 | 46.0 | 47.00 | 47.00 | 48.0 | 2 |

*Table 42*

## *Values of JP8 for Cetane Index by Region*

(Volume in Millions of Gallons)

(Spec = Report)

| Year | Region | Fuel | Volume | Min | Avg | WtAvg | Max | Count |
|---|---|---|---|---|---|---|---|---|
| 1990 | 5 | JP8 | 4.0 | 39.8 | 40.27 | 40.25 | 40.5 | 7 |
| 1991 | 5 | JP8 | 8.5 | 40.5 | 40.97 | 40.99 | 41.6 | 14 |
| 1991 | 8 | JP8 | 3.9 | 35.0 | 35.67 | 35.67 | 36.0 | 3 |
| 1992 | 5 | JP8 | 4.4 | 40.8 | 41.33 | 41.33 | 41.9 | 7 |
| 1992 | 8 | JP8 | 8.3 | 41.8 | 42.35 | 34.84 | 42.9 | 17 |
| 1993 | 3 | JP8 | 53.9 | 41.0 | 44.24 | 44.71 | 53.5 | 69 |
| 1993 | 5 | JP8 | 118.4 | 36.0 | 41.38 | 40.11 | 43.0 | 65 |
| 1993 | 7 | JP8 | 20.6 | 32.0 | 37.51 | 39.52 | 46.0 | 11 |
| 1993 | 8 | JP8 | 20.6 | 40.0 | 41.95 | 41.75 | 44.0 | 11 |
| 1994 | 2 | JP8 | 28.5 | 38.8 | 43.34 | 32.99 | 46.2 | 16 |
| 1994 | 3 | JP8 | 303.0 | 28.0 | 43.28 | 42.46 | 49.7 | 281 |
| 1994 | 5 | JP8 | 151.1 | 37.0 | 41.45 | 40.51 | 43.0 | 88 |
| 1994 | 7 | JP8 | 5.7 | 34.0 | 41.40 | 42.08 | 45.6 | 3 |
| 1994 | 8 | JP8 | 43.1 | 37.0 | 40.76 | 40.51 | 45.2 | 31 |
| 1995 | 1 | JP8 | 2.9 | 37.6 | 40.08 | 40.00 | 42.6 | 30 |
| 1995 | 2 | JP8 | 126.6 | 42.3 | 44.77 | 39.92 | 47.0 | 76 |
| 1995 | 3 | JP8 | 455.4 | 35.5 | 43.81 | 42.86 | 49.1 | 326 |
| 1995 | 4 | JP8 | 9.9 | 39.0 | 43.49 | 43.76 | 45.6 | 16 |
| 1995 | 5 | JP8 | 239.3 | 37.0 | 41.49 | 40.84 | 43.0 | 154 |
| 1995 | 7 | JP8 | 65.1 | 34.0 | 42.95 | 43.97 | 47.0 | 21 |
| 1995 | 8 | JP8 | 96.4 | 27.4 | 41.84 | 41.06 | 49.0 | 115 |
| 1996 | 1 | JP8 | 18.8 | 37.3 | 41.14 | 40.77 | 45.9 | 50 |
| 1996 | 2 | JP8 | 182.6 | 37.0 | 43.87 | 44.00 | 46.3 | 120 |
| 1996 | 3 | JP8 | 608.8 | 35.7 | 44.23 | 43.86 | 60.0 | 365 |
| 1996 | 4 | JP8 | 76.4 | 35.0 | 41.67 | 41.57 | 46.1 | 81 |
| 1996 | 5 | JP8 | 412.7 | 38.4 | 40.83 | 40.83 | 45.0 | 217 |
| 1996 | 6 | JP8 | 39.9 | 44.5 | 46.13 | 46.11 | 49.0 | 8 |
| 1996 | 7 | JP8 | 259.5 | 37.0 | 43.38 | 38.60 | 52.0 | 81 |
| 1996 | 8 | JP8 | 150.5 | 37.1 | 41.36 | 42.53 | 47.4 | 140 |

*Table 43*

## *Values of JP4 for Net Heat of Combustion by Region*

(Volume in Millions of Gallons)

(Spec Aniline-Gravity = 5250 min, Net Heat = 18400 BTU or 42.8 MJ/kg min)

| Year | Region | Fuel | AG Min | AG Avg | AG Max | BTU Min | BTU Avg | BTU Max | MJ Min | MJ Avg | MJ Max |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1990 | 2 | JP4 | 6498 | 6508 | 6526 | 18621 | 18621 | 18621 | 44.2 | 44.3 | 44.3 |
| 1990 | 3 | JP4 | 6694 | 7032 | 8080 | 18631 | 18658 | 18707 | | | |
| 1990 | 4 | JP4 | 5940 | 7103 | 7840 | 18703 | 18723 | 18773 | | | |
| 1990 | 5 | JP4 | 6445 | 6667 | 6885 | 18198 | 18626 | 18716 | 43.4 | 43.4 | 43.4 |
| 1990 | 8 | JP4 | 6144 | 6510 | 7137 | 18475 | 18656 | 18756 | | | |
| 1991 | 1 | JP4 | 7360 | 7618 | 8106 | 18728 | 18757 | 18787 | | | |
| 1991 | 2 | JP4 | 6297 | 6894 | 8178 | 18666 | 18748 | 18839 | 43.4 | 44.0 | 44.3 |
| 1991 | 3 | JP4 | 4382 | 7219 | 8520 | 18601 | 18683 | 18784 | 43.4 | 43.4 | 43.4 |
| 1991 | 4 | JP4 | 6578 | 7129 | 7920 | 18658 | 18723 | 18798 | 43.4 | 43.4 | 43.4 |
| 1991 | 5 | JP4 | 6140 | 6537 | 6842 | 18599 | 18708 | 18758 | 43.3 | 43.4 | 43.4 |
| 1991 | 8 | JP4 | 5383 | 6580 | 7046 | 18530 | 18697 | 18787 | | | |
| 1992 | 1 | JP4 | 7689 | 7846 | 7966 | 18759 | 18776 | 18809 | | | |
| 1992 | 2 | JP4 | 6360 | 7090 | 8233 | 18709 | 18780 | 18842 | 43.4 | 43.5 | 43.6 |
| 1992 | 3 | JP4 | 6023 | 7105 | 8421 | 18611 | 18682 | 18790 | | | |
| 1992 | 4 | JP4 | 6093 | 7096 | 8080 | 18620 | 18736 | 18822 | | | |
| 1992 | 5 | JP4 | 6248 | 6458 | 6762 | 18654 | 18670 | 18707 | 43.3 | 43.4 | 43.5 |
| 1992 | 8 | JP4 | | | | 18642 | 18694 | 18736 | | | |
| 1993 | 2 | JP4 | 6535 | 7106 | 8037 | | | | 43.5 | 43.6 | 43.7 |
| 1993 | 3 | JP4 | 6160 | 7058 | 8265 | 18621 | 18652 | 18790 | 43.4 | 43.5 | 43.6 |
| 1993 | 4 | JP4 | 5823 | 7026 | 9129 | 18435 | 18705 | 18824 | | | |
| 1993 | 5 | JP4 | 6328 | 6680 | 6969 | 18640 | 18657 | 18676 | | | |
| 1993 | 8 | JP4 | 5250 | 5250 | 5250 | | | | 42.8 | 42.8 | 42.8 |
| 1994 | 2 | JP4 | 6420 | 7043 | 7727 | | | | 43.0 | 43.5 | 43.8 |
| 1994 | 3 | JP4 | 6990 | 7415 | 8222 | | | | 43.5 | 43.5 | 43.5 |
| 1994 | 4 | JP4 | 6138 | 7087 | 8051 | 18417 | 18682 | 18848 | 43.4 | 43.5 | 43.6 |
| 1995 | 4 | JP4 | 6474 | 6519 | 6564 | 18445 | 18680 | 18781 | 43.5 | 43.5 | 43.6 |
| 1995 | 7 | JP4 | | | | | | | 43.5 | 43.5 | 43.5 |
| 1995 | 8 | JP4 | | | | | | | 44.0 | 44.0 | 44.0 |
| 1996 | 8 | JP4 | | | | | | | 44.0 | 44.0 | 44.0 |

*Table 44*

## *Values of JP5 for Net Heat of Combustion by Region*

(Volume in Millions of Gallons)

(Spec Aniline-Gravity = 4500 min, Net Heat = 18300 BTU or 42.6 MJ/kg min)

| Year | Region | Fuel | AG Min | AG Avg | AG Max | BTU Min | BTU Avg | BTU Max | MJ Min | MJ Avg | MJ Max |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1990 | 3 | JP5 | 5404 | 5642 | 5851 | | | | | | |
| 1990 | 5 | JP5 | | | | | | | 42.8 | 43.0 | 43.1 |
| 1991 | 2 | JP5 | 6307 | 6386 | 6482 | | | | | | |
| 1991 | 3 | JP5 | 5494 | 6140 | 6527 | 18498 | 18544 | 18568 | | | |
| 1991 | 5 | JP5 | 4931 | 5093 | 5583 | | | | 43.0 | 43.0 | 43.0 |
| 1992 | 2 | JP5 | 6163 | 6291 | 6409 | | | | | | |
| 1992 | 3 | JP5 | 5831 | 6081 | 6371 | 18509 | 18537 | 18639 | | | |
| 1992 | 5 | JP5 | 5202 | 5354 | 5582 | | | | 43.0 | 43.0 | 43.0 |
| 1993 | 3 | JP5 | 5873 | 6201 | 6482 | 18533 | 18575 | 18594 | 43.2 | 43.2 | 43.2 |
| 1993 | 5 | JP5 | 5134 | 5220 | 5268 | | | | | | |
| 1993 | 7 | JP5 | 5414 | 5832 | 6112 | | | | | | |
| 1994 | 3 | JP5 | 5541 | 5964 | 6333 | | | | 43.2 | 43.2 | 43.2 |
| 1994 | 7 | JP5 | 5781 | 6091 | 6567 | | | | | | |
| 1995 | 3 | JP5 | 5009 | 6049 | 6408 | | | | | | |
| 1995 | 7 | JP5 | 5859 | 6360 | 6688 | | | | | | |
| 1996 | 3 | JP5 | 4899 | 6142 | 6525 | | | | | | |
| 1996 | 5 | JP5 | 5224 | 5408 | 5840 | | | | 41.6 | 42.6 | 43.1 |
| 1996 | 7 | JP5 | 5894 | 6187 | 6658 | | | | 42.2 | 43.0 | 43.3 |
| 1996 | 8 | JP5 | | | | | | | 43.1 | 43.2 | 43.3 |

## *Table 45*

### *Values of JP8 for Net Heat of Combustion by Region*

(Volume in Millions of Gallons)

(Spec Net Heat = 18400 BTU or 42.8 MJ/kg min)

| Year | Region | Fuel | AG Min | AG Avg | AG Max | BTU Min | BTU Avg | BTU Max | MJ Min | MJ Avg | MJ Max |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1990 | 5 | JP8 | | | | | | | 43.0 | 43.0 | 43.1 |
| 1991 | 5 | JP8 | 5208 | 6377 | 7351 | | | | 43.0 | 43.0 | 43.0 |
| 1991 | 8 | JP8 | 5208 | 5208 | 5208 | | | | 43.1 | 43.1 | 43.2 |
| 1992 | 5 | JP8 | | | | | | | 43.0 | 43.0 | 43.0 |
| 1992 | 8 | JP8 | 6429 | 6429 | 6429 | 18552 | 18569 | 18588 | 43.2 | 43.2 | 43.2 |
| 1993 | 3 | JP8 | 6155 | 6637 | 7583 | 18445 | 18600 | 18658 | 43.0 | 43.1 | 43.2 |
| 1993 | 5 | JP8 | 5749 | 6879 | 7316 | 18492 | 18531 | 18616 | | | |
| 1993 | 7 | JP8 | 6751 | 7075 | 8180 | | | | 43.1 | 43.3 | 43.7 |
| 1993 | 8 | JP8 | 6196 | 6727 | 7516 | 18552 | 18580 | 18669 | | | |
| 1994 | 2 | JP8 | 5810 | 5810 | 5810 | 18549 | 18605 | 18639 | | | |
| 1994 | 3 | JP8 | 5810 | 5953 | 7410 | 18474 | 18588 | 18951 | 42.8 | 43.1 | 43.4 |
| 1994 | 5 | JP8 | 5810 | 6153 | 7410 | 18485 | 18515 | 18580 | | | |
| 1994 | 7 | JP8 | 5913 | 5913 | 5913 | | | | 43.3 | 43.5 | 43.6 |
| 1994 | 8 | JP8 | 5810 | 6080 | 7410 | 18494 | 18553 | 18629 | | | |
| 1995 | 1 | JP8 | | | | | | | 43.1 | 43.1 | 43.2 |
| 1995 | 2 | JP8 | 5913 | 6153 | 7352 | 18540 | 18613 | 18645 | 43.1 | 43.2 | 43.2 |
| 1995 | 3 | JP8 | 5913 | 6274 | 6825 | 18523 | 18615 | 19188 | 42.8 | 43.2 | 43.8 |
| 1995 | 4 | JP8 | | | | 18557 | 18603 | 18632 | 43.2 | 43.2 | 43.3 |
| 1995 | 5 | JP8 | 5828 | 6263 | 6396 | 18483 | 18523 | 18611 | 43.0 | 43.0 | 43.1 |
| 1995 | 7 | JP8 | 5913 | 5913 | 5913 | | | | 43.2 | 43.3 | 43.7 |
| 1995 | 8 | JP8 | 5913 | 5913 | 5913 | 18514 | 18558 | 18689 | 42.8 | 43.2 | 43.4 |
| 1996 | 1 | JP8 | | | | | | | 43.1 | 43.1 | 43.3 |
| 1996 | 2 | JP8 | | | | 18500 | 18606 | 18647 | 43.1 | 43.2 | 43.3 |
| 1996 | 3 | JP8 | 5843 | 6266 | 6402 | 15585 | 18562 | 18950 | 43.0 | 43.2 | 43.4 |
| 1996 | 4 | JP8 | | | | 18544 | 18605 | 18649 | 42.8 | 43.2 | 43.2 |
| 1996 | 5 | JP8 | 5857 | 6183 | 6793 | 15566 | 18503 | 18984 | 43.0 | 43.0 | 43.1 |
| 1996 | 6 | JP8 | | | | | | | 43.3 | 43.4 | 43.4 |
| 1996 | 7 | JP8 | 5571 | 5948 | 6283 | | | | 43.1 | 43.2 | 43.4 |
| 1996 | 8 | JP8 | 5665 | 5692 | 5719 | 15589 | 18493 | 18975 | 43.1 | 43.7 | 46.7 |

NATO/CEPS JA1 Min/Max: "43.0 - 46.9 MJ/kg". Mean of 43.3 MJ/kg.